TETRA TECH INC PASADENA CA F/G 9/2 COMPUTER PROGRAMS FOR CALCULATING PARTIALLY CAVITATING BLUNT TR--ETC(U) JAN 80 S MAEKAWA, O FURUYA N00014-79-C-0234 NL TETRAT-TC-3284-02 NL AD-A081 832 UNCLASSIFIED 10= 3 41) AQR: FI 3u

Report No. TC 3284-02 Contract No. N00014-79-C-0234 (GHR Program)

ADA 081832

COMPUTER PROGRAMS FOR CALCULATING PARTIALLY CAVITATING BLUNT TRAILING EDGED CASCADE FLOWS IN NONLINEAR THEORY

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Shin Maekawa Okitsugu Furuya

TETRA TECH, INC. 630 NORTH ROSEMEAD BOULEVARD PASADENA, CALIFORNIA, 91107

Prepared for

DAVID W. TAYLOR NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER BETHESDA, MARYLAND 20084

OFFICE OF NAVAL RESEARCH 800 NORTH QUINCY STREET ARLINGTON, VIRGINIA 22217

JANUARY 1980

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This research was carried out under the Naval Sea Systems Command General Hydromechanics Research Program Subproject SR 023 09 01, administered by the David W. Taylor Naval Ship Research and Development Center, Contract N00014-79-C-0234.

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REPORT DOCUMENTATION PAGE	READ INSTRUCTIONS BEFORE COMPLETING FORM			
1. REPORT HUMBER 2. GOVT ACCESSION N	G. 1. RECIPIENT'S GATALOG NUMBER			
TC 3284-02				
Computer Programs for Calculating Partially Cavitating Blunt Trailing Edged Cascade Flows in Nonlinear Theory	Technical Manual for Appears 15 Feb - Oct Appears 15 Feb - Oct Appears 15 Techning one report works a Performing one report with the Performance of the Perf			
Shin/Maekawa Okitsugu/Furuya (14) (15)	4. CONTRACT OR GRANT NUMBERS NO0014-79-C-0234			
7. PERFORMING ORGANIZ TION NAME AND ADDRESS TETRA TECH, INC. 630 North Rosemead Blvd. Pasadena, CA 91107	DWTNSR&DC 9191967/10-30-78(1505)			
11. CONTROLLING OFFICE NAME AND AGGRESS David W. Taylor Naval Ship R&D Center Department of the Navy Bethesda, Maryland 20084	12. REPORT DATE 1 / January 1980 13. NUMBER OF PAGES 202			
14. MONITORING AGENCY NAME & ADDRESS(If different from Controlling Office)	15. SECURITY GLASS. (of the report)			
Office of Naval Research 800 North Quincy Street Arlington, Virginia 22217	Unclassified 154 CECLASSIFICATION/ COWNGRADING SCHEDULE			
14. DISTRIBUTION STATEMENT (of this Report)				

17. DISTRIBUTION STATEMENT (of the abstract entered in Black 20, if different from Report)

Approved for public release; distribution unlimited

14. SUPPLEMENTARY NOTES

Sponsored by the Naval Sea Systems Command General Hydrodynamic Research Program and administered by the David W. Taylor Naval Ship R&D Center, Code 1505, Bethesda, Maryland 20084.

19. KEY WORDS (Continue on reverse side if necessary and identify by black number)

Users' manual for computer programs
Partial cavity flow
Cascade
Nonlinear theory
Partially cavitating propeller

ABSTRACT (Continue on reverse side if necessary and identify by block manbor)

In addition to the previously developed partially cavitating cascade theory, two new flow models were constructed in search of a better flow model for determining accurate force coefficients. Effort has been made for obtaining (1) physically acceptable flows, particularly the location of cavity boundary and (2) smooth matching of the flow characteristics between the partially cavitating and supercavitating flow regimes. Based on the numerical results made with these flow models for practical blade profiles taken after a supercavitating propeller it was found that no single flow model developed above could handle the complete set of —

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20. cascade geometries and incidence angles. One theory was supplemental to the other and no definite guideline was discovered for selection of an appropriate flow model for a specified flow condition to be solved except for a few weak evidences.

This report is a users' manual for the computer programs developed above, describing the structure of program, input data set-up, typical output data and listing.

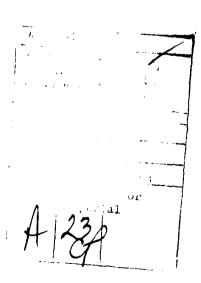
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1.0 INTRODUCTION

Three computer programs were developed under the present work (see [1]). Two of these programs, PCASE and PCASLE, used the open wake models, whereas the third one, PCASLDW, used the double wake model of the partially cavitating cascade flow. PCASE requires the cavitation number, and PCASLE and PCASLDW require the cavity length as input data. The detailed explanations in regard to the type of model used for these programs are given in [1]. The general rule of thumb is that if the cavity length is short and/or the negative camber on the suction side of the cascade is small, PCASE converges rapidly, whereas if the cavity length becomes long and/or the negative camber on the suction side of the cascade is large, PCASLE provides a better convergence. PCASLDW may be used when the pressure-side camber is large so that the calculated cavity boundary tends to intersect the upper surface of the blade in the supercavitating cascade flow configuration.

Six solution parameters are to be determined for PCASE: these include three transform coordinates, scaling factor for mapping, deflected flow angle at downstream infinity, and ratio of flow passage width at downstream infinity to that at upstream infinity. For PCASLE, one extra solution parameter, i.e., cavitation number is added, making the total number of solution parameters seven. For PCASLDW, one of the solution parameters, i.e., ratio of flow passage at downstream infinity to upstream infinity, was deleted, but two new solution parameters, i.e., two transform coordinates, were introduced, making the total number of solution parameters eight. PCASLDW requires the most computer time of the three to carry out one iteration due to the increased total number of solution parameters.

In the following, the structure of the program including various subroutines, input data set-up, typical output data and

listings of these three programs is described. Due to the similarity in the input data set-up of the programs, only that of PCASE is given completely. It is believed that there will be no difficulty in running PCASLE and PCASLDW once one becomes familiar with PCASE.

2.0 STRUCTURE OF PCASE

PCASE consists of a main program and several subroutines, brief descriptions of which will be given as follows:

- 1) MAIN PROGRAM PCASE
 - o Specify the dimensions for data.
 - o Read input data.
 - o Exercise Newton's iterative procedure.
 - o Calculate lift and drag coefficients at the end of each iteration.
 - o Calculate the cavity profile.
- 2) SUBROUTINE OXFNEW(X,STOL,M,I,DG,DF,FFF4)
 - o Exercise Newton's iterative procedure in calculations for the six integral equations to find the six unknown solution parameters.
 - x: Input and output data in array SXSI(I)
 - SXSI(1): ξ coordinate for the point B of the foil.
 - SXSI(2): ξ coordinate for the point C.
 - SXSI(3): ξ coordinate for the point F.
 - SXSI(4): A, coefficient of the mapping function.
 - SXSI(5): α_2 , downstream flow angle.
 - SXSI(6): ε ratio of d₂ to d₁
 - STOL: Control variables for the accuracy of Newton's iterations.
 - M: Number of desired iterations for Newton's procedure.
 - I: Counts the number of iterations of Newton's procedure.
 This is defined within OXFNEW.
 - DG: This is one of the assigned finite differences for the numerical derivations of $\frac{\partial f}{\partial x}$. However, it is no longer used in the calculations themselves as it has been replaced by the array DELI(I,J) which is read in at the beginning of the program.
 - DF: Same as DG.
 - FFF4: The residue of equation F(4); if FFF4 becomes larger than S4 of input data, the program is stopped.
- 3) SUBROUTINE OFSIM1 (ANS, NOF, XCA)
 - o Calculates integral I(1) of integral equation F(1) for special ease of foil shape with rounded left end. Called from subroutines: FlINTL, RMINT, CAVITY (see Reference [1] for F(1)).
 - ANS: Final answer for the integral I(1) of equation F(1).

NOF: This is a controlling variable passed on from the calling subroutines:

NOF = 0 - OFSIM1 called from FlINTL

NOF = 1 - OFSIM1 called from RMINT for real part NOF = 2 - OFSIM1 called from RMINT for imaginary

part

NOF = 3 - OFSIM: called from CAVITY OXFNEW at F(5)

XCA: Integration variable passed on to OFSIM1 only if
 NOF = 3.

- 4) SUBROUTINE OFSIM2 (ANS2)
 - o Controls iterative procedure for calculating integral equation F(4). Called from OXFNEW (see Reference [1] for F(4)).

ANS2: Final answer of OFSIM2

- 5) SUBROUTINE OFSIM3 (Y,XXII,IP,I)
 - o Calculates $g_1(\xi)$ in integral equation F(4). Called from OFSIM2. (see [1] for $g_1(\xi)$).
 - Y: Integration variable passed from OFSIM2, corresponding to ξ .
 - XXII: Returns value of g_1 (ξ) to OFSIM2. The parameter is passed from OFSIM2 to OFSIM3 in the form of one element of an array (XITC(I)) inside an iterative loop.
 - IP: Number referring to the control point; IP = 1 to LPM.
 - I: I = 2 for the subdivided middle point between the
 regular control points specified by IP; I = 3 for
 the control points.
- 6) SUBROUTINE OFSIM5 (ANS5)
 - o Calculates values of F(5) using Simpson's rule and Chebyshev-Gauss polynomials.

ANS5: Value returned to loop in OXFNEW for equation F(5).

- 7) SUBROUTINE FLINTL (YINT, KCTRL)
 - o Calculates integrals in integral equation F(1). Called from OXFNEW.
 - YINT: Value returned for integral each time FlINTL is called.

8) SUBROUTINE G2 (XS2, AG2, IS2)

- o Calculates g_2 (ξ) in F(5) given integral variable ξ , i.e., XS2. Called from iterative loop in OFSIM5.
- XS2: Abscissa subdivision points from which g_2 (ξ) are calculated, i.e., ξ .
- AG2: Value for g_2 (ξ) returned to OFSIM5 after each time it is called.
- IS2: Number of control points on the second arc S2.

9) SUBROUTINE RMINT(SR, SM, MIQ)

- o Calculates r_1 , r_2 , r_3 , r_4 ; m_1 , m_2 , m_3 , m_4 of equations F(2) and F(3) respectively. These values are used to calculate F(2) and F(3) in OXFNEW (see [1]).
- SR: Value for r returned to OXFNEW
- SM: Value for m returned to OXFNEW
- MIQ: Control variable passed from OXFNEW dictating which value (1, 2, 3 or 4) of r or m is to be calculated.

10) SUBROUTINE CAVITY (XCC, YCC)

- o Calculates coordinates of points along cavity crosssection to give cavity shape. Passes cavity endpoint coordinates back to OXFNEW.
- XCC: Value returned to OXFNEW for x coordinate of cavity endpoint.
- YCC: Value returned to OXFNEW for y coordinate of cavity endpoint.

11) SUBROUTINE IC2 (SR, SM, XCA, ISIC)

- o When ISIC = 0 used to calculate r_4 and m_4 of equations F(2) and F(3) respectively. It is then called from OXFNEW. When ISIC = 1 it is used to calculate.
- SR,SM: When called from RMINT this is the returned value for r_4 and m_4 . When called from CAVITY, only SR is used and SM becomes dummy (see Reference [1]).
 - XCA: Only used for ISIC = 1, integration variable.
 - ISIC: This is a control variable which tells IC2 whether to do calculation for OXFNEW or for OFSIM5 or CAVITY.
 - = 0 called from RMINT.
 - = 1 called from CAVITY IN OFSIM5 for F(5).

- 12) SUBROUTINE MOSEC (A,B,ER1,X,J,XLPA,IS112)
 - o Finds a root of f(x) = 0 where x must lie between A and B and f(A) > 0, f(B) < 0.
 - A.B: A root of f(x) = 0 exists between A and B.
 - ER1,ER2: Accuracy controlling variables where $|\mathbf{x}_{\text{real}} \mathbf{x}| < \text{ER1}$ and $|\mathbf{f}(\mathbf{x}_{\text{real}}) \mathbf{f}(\mathbf{x})| < \text{ER2}$.
 - x: A root of f(x) = 0, found in this subroutine and returned to the calling program.
 - J: Number of iterations done in MOSEC.
- 13) FUNCTION AITKEN (XX, YY, X, N)
 - o Interpolate the value corresponding to X with the data of XX(N), YY(N) specified by Aitken method.
- 14) SUBROUTINE DETERM (A,N,D)
 - o Calculates determinant of a matrix A of rank N
 - A: Matrix input, requiring dimension.
 - N: Rank of the matrix.
 - D: Calculated determinant of A.
- 15) SUBROUTINE ARCS2 (S2,XC,YC)
 - o Calculates the arc length of the upper wetted portions S2. Called from OXFNEW in calculations for F(5) after the CAVITY subroutine.
 - S2: returned arc length of arc S2.
 - XC: X-coordinate of cavity endpoint.
 - YC: y-coordinate of cavity endpoint.
- 16) SUBROUTINE ARCLEN (XSS, XL, XH, IS112)
 - o Calculates arc length of small intervals between XL and XH along foil profile.
 - XSS: Returned arc segment length.
 - XL: Lower x coordinate of segment endpoint.
 - XH: Upper x coordinate of segment endpoint.
 - ISII2: Control variable telling the routine whether the upper or lower edge of the foil is to be looked at; ISII2 = 0 for the lower edge, ISII2 = 1 for the upper edge.
- 17) SUBROUTINE XCYC (XCB, YCB, CX, CY)
 - o Calculates the point on the upper face of the foil corresponding to the endpoint of the cavity.

- XCB: X-coordinate of returned point on foil.
- YCB: Y-coordinate of returned point on foil.
- CX: X-coordinate of cavity endpoint.
- CY: Y-coordinate of cavity endpoint.
- 18) SUBROUTINE BBBETA (XX, RBETA, IS112)
 - o Calculates BETA(X(XSI))
 - XX: X-coordinate of the body for which the local body slope RBETA to be calculated.
 - RBETA: Local body slope in radians calculated in this subroutine.
 - IS1I2: Control variable; = 0 for the lower portion
- 19) SUBROUTINE FARC (FAR, XLPA, X1B, IS112)
 - o Calculates the difference between the arc length DSS and that corresponding the 5-coordinates of XLPA and XlB.
 - IS1I2: The same as that in BBBETA.
- 20) SUBROUTINE SHAPE (X,Y,BETA,IS112)
 - o Calculates points along cross-section of foil to give shape of foil. Also gives the angle of the tangent to the foil at each point.
 - X: X-coordinate for which Y and BETA to be calculated.
 - Y: Y-coordinate of calculated point.
 - BETA: Angle of tangent to the foil at calculated point.
 - IS1I2: Control variable to tell the subroutine whether to look at the upper or lower face of the foil.
- 21) SUBROUTINE FC2 (T,F,XL,XH,IS1I2)
 - o Calculates values of the function along the wetted arc to be integrated in the subroutine ARCLEN.
 - T: Value to be calculated at.
 - F: Value of the function.
 - XL: Low limit of the integration.
 - XH: Upper limit of the integration.
 - IS1I2: Control variable; = 1 for sharp leading edge
 - = 0 for round leading edge

3.0 INPUT DATA

The following data are those for the family program of PCAS (Partially Cavitating Cascade Cases) which include PCASE, PCASLE, and PCASLDW. Formatting examples are shown in Section 3.1. Several data cards must be changed in order to run the different version of PCAS.

It is important to note that these programs, particularly PCASLDW, were written to be able to handle blunt trailing edged foils properly. Readers are advised to see [3] for the cases having sharp trailing edges. The input data set-ups shown below are those for calculating the two-dimensional loadings for a partially cavitating propeller. The input parameters representing the propeller blade configurations include R, AAAA, to CCCC, A8 to D8 XROUND and A2AA to C2CC. The definition of these parameters is described in [1]. The thickness of the foil which was used for the plano-convex foil case in the previous project [1] is now a dummy input in these programs.

3.1 INPUT DATA FOR PCASE

DATA CARD NO.	SYMBOL	DESCRIPTION	FORMAT
1	NGAUS	Number of subdivisions used in Gaussian integration.	110
2-4	TGAUS(I)	Abscissas of Gaussian inte- gration.	4F20.10
5-7	WGAUS(I)	Weight factors of Gaussian integration.	4F20.10
8	XXM	Weighting factor for solu- tion parameters in iterative procedure (0 to 1).	F10.8
9-14	DELT(I,J)	Increment for numerical cal- culations of partial deriva- tives.	6F10.8
15	TH	The thickness in percent of the plano-convex foil (dummy variable).	3F20.10
	XXDD	<pre>End of the normalized foil = 1.</pre>	
	YYDD	Y coordinate of upper end of the normalized foil.	
16	R	Specifies the radial location on the propeller blade (normalized to be unity at the tip)	4F20.10
	AAAA,BBBB,CCCC	Coefficients for terms in the equation of the cross-sectional shape of the lower face of the propeller blade. These coefficients are used in the second equation for x values along the cross-section where $.2 \le x \le .8$ (see Reference 2 for the form of equation).	

17	A8,B8,C8,D8	Coefficients for third equation of cross-sectional shape of the lower face of the blade where $x \le .8$ (see [2] for the form of equation).	4F20.10
18	XROUND	Leading edge radius. This is actually used only when ISHARP = 1 (rounded leading edge). Otherwise it is a dummy variable.	4F20.10
	A2AA,B2BB,C2CC	Coefficients for first equation of cross-sectional shape of the lower face of the blade where $x \le .2$ (see [2] for the form of equation).	
19	AAAAU,BBBBU,CCCCU	Coefficients for second equation of cross-sectional shape of the upper face of the blade where $.2 \le x \le .8$ (see [2] for the form of equation).	4F20.10
20	A8U,B8U,C8U,D8U	Coefficients for third equation of cross-sectional shape of the upper face of blade where $x \ge .8$ (see [2] for the form of the equation).	4F20.10
21	A2AAU,B2BBU,C2CCU	Coefficients for first equation of cross-sectional shape of the upper face of blade where x < .2 (see [2] for the form of the equation).	4F20.10
22	IFLAG1	<pre>= 0 - for regular runs ≠ 0 - for runs reading data from CASCLIM. Needs extra data for SXSI(2), SXSI(3).</pre>	2110
	NCHBY	The number of Chebyshev-Gauss control points.	
23	SBETA	Initial angle of incidence for a starting flat plate solu- tion in degrees.	5E14.7
	SBETA2	Body angle of a flat plate in degrees. Used as an initial solution.	

	SF4	Always set = 10. Used to stop computation if the calculated arc length S1 becomes larger than SF4.	
	BETAB	Body angle at point B.	
	BETAC	Body angle at point C. (initially assumed value)	618
24	LPMS	Number of control points over the ξ coordinates between $\xi = -1$ and b. Used for first arc length S1. (see Reference [1]).	
	LPKS	Number of subdivisions between ξ = b and the last point of the coarse division made by LPMS.	
	LPM2	Same as LPMS only used for calculations on second arc length S2. Note that there is only I segment spacing here.	
	IFLAG	<pre>= l - for first run which requires data to be fed in, i.e., but only SXSI(1) to SXSI(5).</pre>	
		= 0 - for use of previous data in which case data will be read either from a data card (if IREAD = 5) or from tape (if IREAD = 1). For IREAD = 5, not only SXSI(1) to SXSI(5) but also SARC(I), BETAN(I): SARC2(I), BETA2 must be read from the data card.	
	IREAD	Used for controlling where data is read from. Either tape or card as above.	
	ISHARP	<pre>= 0 - for sharp leading edge. = 1 - for rounded leading edge.</pre>	
25	NITER	Number of flow configurations to be calculated in 1 run.	418

	MSTOP	Number of iterations to stop the larger nest.	
	MAXIT	Number of iterations for Newton's loop.	
	NHK	Control index for varying either the set values of the angle of incidence, solidity, or cavitation number, depending on 1, 2, or 3, respectively for the NITER loop.	
26	ALFA1S	Flow incidence angle in degrees (see Figure 1).	4E14.7
	GAMMAS	Cascade geometric stagger angle in degrees (see Figure 1)	
	SOLIS	Solidity of the cascade	
		(= ^c /s in Figure 1)	
	SIGMS	Cavitation number	
		$= (p_1 - p_c) / \frac{1}{2} \circ V_1^2$	
27	DE,DG,DF	Finite differences for numer-	3E14.7
		ical derivations of $\frac{\partial f}{\partial x}$ in sub-	
		routine OXFNEW. These are replaced by DELT(I,J), no longer used.	
28	SXSI(I), I = 1,6	This card is necessary only if IFLAG = 1; SXSI(I), I = 1.6 correspond to b, c, f, \tilde{A} , α_2 , and ε . Values for SXSI(I) must be arbitrarily assumed and tried to see if a convergent solution is obtained.	6E13.6
29	SARC(1), BETAN(1)	Arc length vs. local incidence angle in radians for the lower portion of the body; these data are	2E14.7
29	+ LPM SARC(LPM), BETAN(LPM)	needed only if IFLAG = 0 and IREAD = 5.	

30 + LPM SARC2(1) BETAN2(1)

/
30 + LPM + LPM2

SARC2(LPM2) BETAN2(LPM2)

Arc length vs. local incidence angle in radians for the upper portion of the body; these data are needed only if IFLAG = 0 and IREAD = 5.

2E14.7

3.2 INPUT DATA FOR PCASLE

Several input cards change from those of PCASE. Only the changes are noted here.

DATA CARD NO.	SYMBOL	DESCRIPTION	FORMAT
9-14	DELT(I,J)	Increment for numerical calculations for partial derivatives.	7F10.8
26	ALFA1S	Flow incidence angle in degrees (see Figure 1).	4E14.7
	GAMMAS	Cascade geometric stagger angle in degrees (see Figure 1).	
	SOI IS	Solidity of the cascade $(=C/S)$ in Figure 1).	
	CAVLEN	Specified cavity length $(= l_C \text{ in Figure 1})$.	
28	SXSI(I), I = 1,7	This card is necessary only if IFLAG = 1; SXSI(I), I = 1, 7 correspond to b, c, f, \tilde{A} , α_2 , σ , and ε .	7F10.7

3.3 INPUT DATA FOR PCASLDW

Several input cards change from those of PCASE. Only the changes are noted here.

DATA CARD NO.	SYMBOL	DESCRITPION	FORMAT
9-15	DELT(I,J)	Increment for numerical calcu- lations for partial derivatives.	8F10.8
26	ALFAIS	Flow incidence angle in degrees (see Figure 2).	4E14.7
	GAMMAS	Cascade geometric stagger angle in degrees (see Figure 2).	
	SOLIS	Solidity of the cascade $(= C/S)$ in Figure 2).	
	CAVLEN	Specified cavity length $(= \ell_c \text{ in Figure 2})$.	
28	SXSI(I),I=1,8	This card is necessary only if IFLAG = 1; SXSI(I), I = 1, 8 correspond to b, c, f, \tilde{A} , α_2 , σ , g, and h.	8F10.7

3.4 TYPICAL DATA SET-UP FOR PCASE

```
PIASCAD.P7.T100.CM120003.504833.MAEKA#A
FETCHPS.PCASCH.LGO.PROP.
FEF2425.92ASC4.FAPE1.9C317.
.33.
EXTERPS. POASCA.TAPE7.POTIT.
REMENDATARET.
3)27835.T1257.3UT2UT.
        2:
         .0748265211
.6360536807
.7637717273
                                             •37370608E7
                              .2277859511
                                                                        •51C367C 2
                             .7453319165
                                                   .5391169715
                                                                        .91223-4293
                              .9931255992
         +1527533571
                              -1491729365
                                                   •1423961093
                                                                        ·1316886384
         .11315+5320
                              .1019301193
                                                   ·0:32767415
                                                                        .3526720463
         .0406014295
                              .0176140071
      3.7
 +3020301 +3030301 +3000731 +3030601
+303331 +333301 +3033701 +0000331
                                                     .7000001
.7000001
  .3633331
                                       1.
                    0.0155532
                                         -3.0669965
                                                              0.0054452
                                         0.6723551
-0.0138038
0-1345763
                     -0.5573011
                                                               -0.3152717
3.6301312
                     -0.0223314
                                                              -1 . CE 6 72 03
                    .3021335
-.270=362
.3335542
                                         .:325911
                                         •3919481
•3526387
•1953438
                                                              -.1733240
                     -.5339753
•1555552
                  40
                       -133.
                                       13.
                                               -180•
                                                          -19(.
           3.0
                      40
                               1
                     53.63
                                      . 435
                                                       • 3
         1.5-7
                       1.5-3
                                      1.5-5
```

3.5 TYPICAL DATA SET-UP FOR PCASLE

* *

```
PIASCL7.P7.1200.C4120000.304633.44EKA.A
FEF3425420A5-74_33420-7.
FETCHPS.PCASL7.F4PE1.PL004.
.;).
ENTERPS. PCASL 7. TAPE7. PLC 04.
REALNONIAPET.
       23
        .0755255211
                            .2277853511
                                               .3737960387
                                                                  •510567C 2
        .5360535807
                            -7453319065
                                               .8391159718
                                                                   · 7122344263
        .9539719273
                            .9931285992
                            .1471727365
        ·1527533971
                                               +1423951393
                                                                   -1315686384
        .1131345323
                                               .0332757415
                            .1019301193
                                                                   • 36 25 7 20 463
        .0+05014299
                            .0175143371
     3.7
          .0000001
  .3333331
  .3033361
  .3033331
 .3333301
  .00033331
  .):)3551
                                                       C .
                 G.
                                    1.
3.5
                   0 - 61193
                                      -1.9602553
                                                          -0.0041395
3.1334857
                   -0.4542559
                                      0.5306437
                                                          -G-2476161
3.333755
                   -3.9553112
                                      0.1579639
                                                          -0.3673304
.33/0331
                   .3343799
                                      .3372023
-.2589177
                   .2145351
                                                          .0511030
                                      -.1362176
                   --6395237
· 1 551735
                                      1.0509821
       40
           ٥.
                                     10.
                      -133.
                                               -130.
                                                          -186.
           30
                     40
     71
                                     1
             1
                     5
                     43.33
                                   • 535
                                                  • 3 5
                     1.2-3
                                   1.5-5
.333335 .325 .32535357 .05225321 .32733555 -.3549531 .35300000 .3570967
```

3.6 TYPICAL DATA SET-UP FOR PCASLDW

```
P145#94P74T30C4C4120000+904302,4AEKA#A
FETCHPS+PCAS+9+_30+PC#9+
FETCHPS.PCASCH9.TAPE1.PH003.
ENTERPS.PCASCA9.TAPE7.PW004.
RESINDATAPET.
DOPESSE . TAPET. DUTPUT.
CKII.
EREC.
3J42,0.
FLY.
FILES.L=ZZTAP.
FEFSHPS.DFM.DFM.JFM.
04___DF4.
       20
                                               -3737060987
                                                                  ·5109670 2
        .0755255211
                           .2277858511
                                                                  .9122344263
        .6360536507
                           .7453319065
                                               .8391169718
                           .9931255992
        .9539719273
        -1527533571
                           .1491729365
                                               -1420951093
                                                                  .1315556384
                                                                  .0625720483
        •1131945320
                           .1019301196
                                               .0832767415
        .0405014293
                           .3175140371
     0.7
 .0006661
                                                                     .666666C1
                                                                     .0000001
                                                                     •3000001
                                                                    .0000001
                                                                     •C000C01
                                                                     •000CC01
                                                                     .0000001
                                      -0.0669965
                                                         0.0054432
                   0.0153502
                                                         -9-3152717
                   -0.5573011
                                      0.6723851
0.1345753
3.3300312
                   -0.0223314
                                      -0.0138038
                                                         -0.0807203
.1335542
                   .0021305
                                      .0328911
.3355433
                   -.2703552
                                      .3318481
                                                         --1733240
                   -.5339753
                                      .3526987
.1536532
       40
           G.
30
                                                          -180.
                      -130.
                                     10.
                                              -130.
                     4 C
     71
                                     1
                     4
                             1
                   53.63
                                    . 485
                                                   •98
        1.5-7
                     1.5-3
                                   1.5+5
1.00
. .
```

4.0 OUTPUT DATA

Most of the output are self-explanatory, however, those not explained in output data are described as follows:

- T(I): This is just a repetition of the input data TGAUS(I).
- W(I): Repetition of input data WGAUS(I).
- X(I): Solution parameters corresponding to SXSI(I). Each time these appear they are an updated version of those preceding them.
- CAV(X): This gives the x-coordinate of the cavity endpoint.
- CAV(Y): This gives the y-coordinate of the cavity endpoint.
- P(I,J): Partial derivatives of Function F(I) used for Newton's method.
- YINT4: Solution to 4th integral of equation F(1).
- SOLNR & SOLNM: Intermediate calculated values of integrals, only used for checking the numerical accuracy.
 - F(X): Residue of each function F(1)...F(8)
 - SXSI(I): Solutions.
 - CLINF: Lift coefficient at infinity.
 - CDINF: Drag coefficient at infinity.
 - CCDD: Drag coefficient.
 - CCLL: Lift coefficient.
 - L_{n} : Cavity length to chord ratio.
 - BIGS2: Arc length of the face of the foil. Either upper or lower face.
 - XCCC: x-coordinate of cavity endpoint.
 - YCCC: y-coordinate of cavity endpoint.

- XS2D: Intermediate values used as a check for progress of program. Can be ignored.
- XKSI: Intermediate values used as a check for progress of program. Can be ignored.
- XXX2: x-coordinate distance from the leading edge.
- SARC2: Distance from the leading edge along the upper surface of foil at XXX2.
 - CP2: Normalized pressure at the upper surface of foil at XXX2.
- BBTAN2: Slope of the upper surface of the foil surface at XXX2.
 - XXX: x-coordinate distance from the leading edge.
 - SARC: Distance from the leading edge along the lower surface of foil at XXX.
 - CP: Normalized pressure at the lower surface of foil at XXX.
- BETAN: Slope of the lower surface of the foil at XXX.

4.1 TYPICAL OUTPUT DATA

```
20 JUL 79 16-06-47
                                                                                           LINK - EKY 5000/7000 8.4
              . CAD HAP.
            BLUCK ASSIGN TENTS.
                                                  LENGTH FILE
            SECON
                                 4503E3S
                                                       5+C FTN4LIB
            F745YS= /25YEFL:/
                                    43435
                                                     1
15 FTWALIB
121 FTWALIB
170 FTWALIB
41 STWALIB
             FURUTLE
                                    45+54
45574
             Fale In
             F. REACF
            F. 12.
                                                      41
52
                                    437-4
                                                              FTN4LIB
FTN4LIB
                                    44°25
             F.J.TE
                                                                 FTY4LIE
                                    #+221
                                                         ۵3
                                   44344
               2155
                                                        261 FTN4LIB
034 FTN4LIB
616 FTN4LIB
              .∛30 ±
1126=
                                     44626
                                    Anger=
             Arakar=
.utcoh=
.utch=
.utc=
.utc=
                                                                 FTN4LIS
                                                        +15
                                                        242
                                                                 FTW4LIS
                                                                 FTNALIB
                                                                 FT1 41.12
              400=
                                     47.14
                                                                 FTHALIB
              + E . L . L =
                                                         ÷ 9
                                                              FTN4LIS
FTN4LIS
              SINC IS.
              ยีนี่จุ่กั∙
รชรมยี่=
                                                        1 FTN4LIS
74 FTN4LIS
49 FTN4LIS
FTN4LIS
                                     47125
47127
47153
              145=1ST
                                    47245
47345
47315
47315
                                                         3 to
2
3 C
                                                                  FTNALIE
              719.
2224...
17-5
                                                                  FT%4LIS
                                                                  FTWALIS
               7 =
                                                                 FTMALIE
                                                                 FTHALIS
                                                  £€
1104€
                                      4-3-4
T(1) = .07832672 .02777857 .027778 .05326700 .63505368 .74633191 .83911697 .91223443 .96397193 .9931286.
.(1) = .07832672 .02777857 .02777857 .0126111 .1516354 .01319453 .10153012 .08327674 .06267205 .04060143 .01761461
.(1) = .02777857 .012779 .0127811 .01316354 .01319453 .10153012 .08327674 .06267205 .04060143 .01761461
.(1) = .02777857 .012779 .0127811 .02078311 .02080017 .02080010 .00080010
.02774(1.0) = .02777811 .02078711 .02078312 .02080017 .03080010 .00080010
.02774(1.0) = .0277811 .0207811 .02078110 .02080017 .03080010 .00080010
.02774(1.0) = .0277811 .0207811 .02078110 .02078011 .03080010 .00080010
.02774(1.0) = .0277811 .0207811 .02078110 .02078011 .03080010 .00080010
          x(1)= -124+5915-32
            <(2)= .71:741.E-11
           x(3) = -c +36575-.1
x(4) = -33-79665-.1
            K(3)= -072324538-01
            x(5)= -- +91554145+63
```

والمراوي والمستروف والمستنفية المراوي والمتعارض والمتعار

```
357412= -.3134597E+01
                                                     AK2I=
                                                             +7293484E-91
                       1=
                   =
                                                     xKSI=
                                                              .7213672E-01
               [ ±
                    5
                                                     xKST=
                                                              .7226736E-11
                                                     XKSI=
                                                              .72419978-01
               7 =
                                                     XKSIz
                                                              .7259561E-C1
               ٠..
                    ą
                                                     YKSI=
                                                              .7279329E-C1
                1= 13
                                                     XKS*=
                                                              .7391152E-01
                                                     xKSI=
                                                              .7324922E-01
                  11
                = :2
                        33T4 V2= -+3139F12E+21
                                                     KKSI=
                                                              -7350483E-01
                       #374V2= --3139943E+41
#674V2= --3140409E+81
               i= i3
i= 14
                                                     XKSI=
                                                              .7577679E-01
                                                              .7406341E-01
                                                     YKS1=
                       55TA12= --3140334E+01
                                                                                                    ...
                := 15
                                                     XKSI=
                                                              .7436293E-01
                       .
= 16
                                                     XKSI=
                                                              .7467350E-01
               1= 17
                                                     AK ST =
                                                              .7499321E-01
                        1= 15
                                                     =12XK
                                                              -7532038£-11
                                                     YKSI=
                                                              -7565210E-01
                       56TAV2= --3142777E+01

36TAV2= --3143123E+01

58TAV2= --3143454E+01
               I= 22
                                                     KKSI=
                                                              -7598722E-01
               := 21
                                                     x ≼ ST =
                                                              .7532338E-91
                I= 22
                                                     *KSI=
                                                              A7565A5GE-C1
                       55TAN2= +-51457656+91
55TAN2= +-51457656+91
55TAN2= +-51444354-91
55TAN2= +-314454666+91
               1= 23
                                                     YKSI=
                                                              .7699052E-01
               12 76
                                                     VKSI=
                                                              .7731739E-01
               I= 25
                                                              .776371 GF-01
                                                     YKST=
                                                     xKSI=
                                                              -7794767E-01
                       BBTANA= --3144851E+91

BBTANA= +-3145777E+01

BBTANA= +-3145296E+61
               I= 27
                                                     xKSI=
                                                              .7824719E-01
               I= 25
I= 29
                                                              .7953391E-01
                                                     *KSI=
                                                     XKSI=
                                                              .7396577E-61
               I= 30
                        38TAN2= -.3145476E+91
                                                     KKSI=
                                                              .7906133E-01
                       BSTAN2= +-31456512+01
BSTAN2= +-3145606E+01
BSTAN2= +-3145644E+01
               I= 31
                                                     XKSI=
                                                              .7929968E-61
                                                             .7951740E-01
                I= 32
                                                     xKSI=
               I= 33
                                                     xKSI=
               I= 14
I= 78
                        957A42= -.31+0363E+01
                                                              +7989053E=u1
                                                     KKSI=
                       56T492= --3146165E+01
86T492= --3146257E+01
                                                     XKSI= +8004324E-01
               i= 36
                                                             -=017188E-01
                                                     xKSI=
               1= 37 SSTAN2= --3146317E+01
                                                     xxsi=
                                                              -8027576E-01
                            112 = -.3116365E+C
                                                             -8035424E-C1
                                                     *KSI=
               I= 39
I= 40
                       98TAV2= --3146492E+G1
                                                     xKSI= -8940682E-01
                       SETAN2= -.31+6419E+01
                                                        SI= .8043320E-01
YUPFER= .40352E-01
YUPPER= .40352E-01
                                                     YKST=
                               52= .14214E+00
$2= .14214E+05
            •=5699E+10
  ACEND=
   4CE .. C=
            .656566*17
                                                        Ansbed=
  #05 40=
#02 V0=
             .85839E+00
                               32= .1421+6+00
72= .1421+6+00
52= .1421+6+00
                                                                  .40352E-61
            ***********
                                                                  -40352E-01
   /CE\0=
            **5:39E+u3
                                                        A756E4=
                                                                   .40352E-01
                               32= .14214E+00
32= .14214E+07
32= .14214E+07
                                                                    .40352E-01
   # C E . . D =
            .:5:69E+f*
                                                         YUPPER=
            •25:59E+00
                                                         YUPPER=
  # 05 N C=
                                                                    -40352E-01
            .d59896+23
                                                        4736E3=
   *C: \C=
                                                                    .4.352E-C1
                                                         13553=
                               32= -14214E+03
                                                                    .40352E-01
   YCE .C=
            .:5359E+16
                               S2= +1+2145+03
                                                        #13PER=
                                                                    .403526-01
                               32= -14214E+33
52= -14214E+33
32= -14214E+03
  x C E N D =
            ** fb # 9 E * 10
                                                         VILEBER =
                                                                    -46352E-61
            . a5859£+01
                                                         YUPPER=
                                                                    -43352E-91
   02.40= .d3669E+16
                                                         YUOPER=
                                                                    .40352E+01
                              -.64745445+06
-2126643E+01
                                                  .2742325E+00
P(I.d)= .0539251E+02
P(I.d)= .1553134E+63
                                                                                           -.8532453E+00
                                                                     6.
                                                                                                               -.1615823E+00
                                                                      -- 88 9 71 70F+01
                                                  -.7615547E+00
                                                                                            .5119634E+00
.2497401E+00
                                                                                                               -.5636984E+##
P(I.U) = -.4155335E+02
                               .1919349E+01
                                                  --6797224E+00
                                                                                                               --274973 BE+0 C
                                                                       --1042817E+91
P(1.d) = +.7225529E+02
P(1.d) = .4579417E+02
P(1.d) = .1472087E+03
                               ·35974752+60
                                                  -.3386625E+00
                                                                       +1207028£+G2
                                                                                            .9914400E+00
                                                                                                               --1091612E+01
                               •52363145+01
•31751675+01
                                                  --10591465+02
                                                                        -13694445+32
                                                                                             -1326221E-01
                                                                                                               --1460216E-31
                                                  --1971079E+01
                                                                       -.7924661E+11
                                                                                             -7166 03 AF+00
                                                                                                               -. 7890069F+06
                    61582=
                                 .14214 xCCC=
                                                      -85537 YCCC=
        CAZKE
                                           0.
-00395
                   .60105
         CAVE
                                  24/Y=
        C = / X =
                    .00091
                                  CAVY=
                                             .00251
                    .07281
.00599
        344X =
                                  CAVY=
                                              .70477
        CAVA =
                                  1447 =
                                             aC 2759
                   -71.4d
-01715
-07571
                                  CAVY=
                                             -01096
        CAVAE
                                  こムイヤニ
         CAZX=
CAZX=
                                  CAVYS
                                             .21937
                                  CAYYE
                                             ac 2941
                    .15737
.15717
                                  JAYY=
         Casx=
                                             .32999
        CANAS
                                  CAVY=
                                             .03507
                    •6e72=
                                  714Y=
                                             474760
        CLIA
                    -1127
         SA/X=
                                  CAVYE
                                             . 24746
         CAVX
                    •17s45
                                  CAVY=
                                             .15651
                    -16957
         ... Y =
                                  CAVYE
                                             .05360
                    .2 212
.238.1
.27885
         244 (=
                                  CAVYE
                                             -27251
         244 x =
                                  CAVY=
                                              .03310
        CAIXE
                                  CAVYE
                    -31462
        Caves
                                  CAVY =
                                             -CR344
                    .35364
         CAVES
                                  CAVY
                                             ...9312
        CAVX=
                                  CAVY=
                                              . : 9969
         ニムマムニ
                    •43101
                                  CAVY=
         344 1 =
                                  CAVY=
                    .45644
                                             .10191
                    .5 131
        CAIX=
                                  CAVYE
                                             +13317
                    .53445
                                  CAVY=
        CAVX =
        CATA =
                    -55590
                                  CAVYS
                                             -103E4
```

```
CAVX =
                        • 59 55
                                      CAVY:
                                                  .11728
                        ..2351
                                                  •10218
•10361
           CAVAZ
                                      CAVYE
           CAVAE
                        .64741
                                      CAVY=
            C74X=
                        .. 74==
                                                  .19358
                                      CAVY=
            CAVAS
                        .49722
                                      CAVYE
                                                  .09514
                        .71575
                                                  .19328
            CAVAE
                                     CLVYE
            CAJY=
                        .74:35
                                      CAVY=
            CAVX=
                       .75973
                                      CAVVE
                                                  ·: 9537
                       •77s 13
•79f 1s
•91122
            CAVXE
                                      344Y=
                                                  .18228
                                                  .37776
            CAVX=
                                      CAVYE
            CAVAE
                                                  207253
                                      CAVYS
            CAVX=
                        .82614
                                      CAVY=
                                                  .05452
                                      CAVY=
            CAVX=
                        •6 39 73
                                                  -15764
           CAVX=
                        .85125
                                                  .15152
                                                  .14 . 57
            CAVA=
                        .655:5
                                      C477=
F(1)= -.65452546-93
F(2)= --24317975-03
*(3)=
                 245-54
F(4) = -.11.4e43E-12
F(5)= .12638325-02
F(6)= -.21356165-53
x(1)= -13_3143E-.2
X(2) = .71316235-11
X(3) = .61250125-11
X(4) = .33446345-01
((5)= -.71a1556E-)1
<(=)= .9177=93E+0;</pre>
                        ITERATION NO.= 1
K(1)= -13231435-02
x(2) = .71/15235-11
(63) = .80330125-01
(64) = .33441 45-01
x(5) = -.71c3E5c5-11
•7181547E-01
                  i= 1
                           387442= -+315356JE+01 XKSI=
                           38TAN2= --3133747E+01
                                                                  .7184539E-01
                                                          YKSI=
                          55TAN2= --3154140E+01
55TAN2= --3154597E+01
55TAN2= --3155419E+01
53TAN2= --3155295E+01
                  ; =
                                                         XKSI=
                                                                   .7189706E-01
                     4
5
                                                                   .7197418E-C1
                  Ī =
                                                         *KSI=
                                                         xKS1=
                                                                  .7207625E-C1
                      7
                          -5 472= -031562976-01

50TAN2= -031374906+01

50TAN2= -031379 646-01

50TAN2= -03138566-01
                  Ξ±
                                                          aKSI=
                                                                   .7235263E-01
                  :=
                      3
                                                         XKSI=
                                                                   .7252523E-C1
                                                         xKSI=
                                                                  .7271939E-01
                           := 11
                                                         XXSI=
                                                                   -7316750E-01
                                                                  .7341868E-01
                   I= 12
                                                         ##ST=
                                                                  .7368592E-01
                                                         xKSI=
                  I= 13
                                                                   .7396757E-01
                           ==TAN2= -+3140498E+91
                                                         xKSI=
                          ABTANE -.31463346+21
BBTANE -.31463346+01
BBTANE -.31416526+01
                      .5
                                                         xKSI=
                                                                   +7426190E-01
                                                                   .74567C8E-01
                  I= 15
                                                         YKSI=
                  I= 17
                                                         xKSI=
                                                                  .7468124E-(1
                      14
                           33TAV2= --31+21+3E+01
                                                         xKSI=
                                                                   .7520244E-01
                           DETANZ= -.31424175+01
BETANZ= -.31427776+J1
BETANZ= -.31431235+01
                                                         MKSI=
                                                                   .7552970E-01
                                                                   .7585au1E-01
                                                         XXSI=
                  := 21
                                                         WKSI=
                                                                  +7518634E-01
                           #87442= --3143454E+01
                                                                   -7551765E-01
                      ?2
                           35TAV2= +.3143758E+01
55TAV2= +.3144263E+01
8=TAV2= +.3144344E+61
                                                                   .7684391E-C1
                                                          AKSI=
                  := 23
                                                                   .7716511E-01
                  I= 24
                                                         YKSI=
                                                                   .7747527E-01
                  1= 25
                                                          YKSI=
                           627442= --3144664E+01
                                                                   .7778445E-01
                           55TAN2= --31445516+01
55T142= --3145177E+01
53T142= --31452956+01
                  I= 17
I= 18
                                                         EI2XX
                                                                   .7837878E-C1
                                                                  .7936043E-01
                                                         XKSI=
                                                                  .7862767E-01
                                                         XKSI=
                          35TA 42 - -31+5479E+01

55TA 42 - -31+5479E+01

53TA 42 - -3145345E+01

53TA 42 - -3145345E+01

53TA 42 - -3145944E+01
                  I= 30
                                                                   .7997635E-01
                                                         XKEI=
                  I = 31
                                                         *KSI=
                                                                   .7711243E-01
                                                                  -7332636E-01
                  I= 32
I= 33
                                                         XKSI=
                                                         YKSI=
                                                                  .7952112E-G1
                                                                  .7949372E-01
.7984368E-01
                           55TA-2= --3146763E+31
F5TA-2= --31461666+01
F8TA-2= --3146251E+31
                   1= 14
                                                          xKSI=
                  1 = 35
                                                         xxSI=
                                                                  -7997009E-01
                      16
                                                         xKSI=
                  :=
                                                         := 27
                           3374.2= -.3146317E+C1
                                                         xKSI=
                                                                  -8937217E-01
                           3978:2= -.314636:E+01
                  I= 38
                  I= 19
                           BBTA 42= -.31464 32E+01
                   [= 4:
                           567442= -.31+6+19E+31
                                                             YUPPER= .40353E-01
YUPPER= .40353E-01
               .8591/E+(0
.8591/E+(0
.8591/E+(0
                                   S2= -14193E+03
S2= -14193E+03
S2= -14193E+03
     *CENC#
     *CEVC=
                                                             ANS DESE
                                                                         .40353E-C1
     XCE:LZ#
     xCE Yū=
               .55910E+11
                                   52=
                                         +14193E+01
                                                              *JAPER=
                                                                         .40353E-01
     *CEND=
               .65910E+u,
                                   S2= +14193E+03
                                                              YUPPER=
                                                                         .40353E-01
                                                             YUPPER:
     XCEVC=
               .65919E+00
                                   $2=
                                         •14193E+03
                                                                         -40353E-01
                                                                         -+0353E-01
     KCENDE
               .3591 JE+u)
                                   32=
                                         +1+133E+0"
                                                             TIPET=
               .25913E+65
                                         -1-193E+03
                                                              YUPPERS
                                                                         .49353E-C1
     XCE YG=
                                   52=
     *CEND=
               -a5917E+CC
                                         +14193E+13
                                                              YUPPER=
                                                                          .40353E-01
                                                                         353Eac
               .45913E+J
                                         *1*193E*44
*1*193E*67
                                                              YU2258=
     KCENGS
                                                              A12025=
     xCE\O=
                                   32=
                                                                         .40353E-L1
               .c5713E+65
                                                                          .40353E-01
     RCEYD=
                                                              * 5395 LY
     *CENGS
               -25913E+05
                                   32=
                                          +14193E+C)
                                                              YUPPER=
                                                                         -40353E-01
```

```
P(I.u) = .2642131E+12
P(I.u) = .1534244E+.3
P(I.u) = -.15355E+12
                                                     .2789797E+nG
                                 -.63563495+00
                                                                                               - .a £ 29348£+00
                                                                                                                   -.1615669E+00
                                  .2143754E+*1
                                                                          -.89125E6E+01
                                                                                                .5117232E+00
                                                                                                                   -.5621826E+03
                                   .193265 E+61
                                                      --62323965+00
                                                                          --10443586+01
                                                                                                -2493757E+00
                                                                                                                   -.273965dE+00
  P(1+u) = --72+3513E+02
P(1+u) = -4576756E+02
P(1+u) = -1+72277E+03
                                   -2974679E+CU
                                                      --3+45613E+CC
                                                                           .1268524E+02
                                                                                                .9932853E+C0
.1211292E-01
                                                                                                                   -.109123CE+01
                                  -5252611E+G1
                                                                           -1373571E+42
                                                      --17604851+02
                                                                                                                   --1333738E-01
                                                      -.2009455E+*1
                                   .30168595+41
                                                                          -.7932831E+01
                                                                                                .7156913E+00
                                                                                                                   -.7862634E+0J
                                     *14193 KUCCE
CAVYE **
                                                                                . 24036
                       ≟IG32=
                                                          -85916 YCCC=
            CAVAS
                                     CAVYE
                       ......
                                                .00185
            CAVXE
                                     CAVYS
                       .57691
            CAVAE
                                     CAVY=
                                                 .20252
            CAVXE
                       .00281
.00599
                                                .01760
                                     CAVA=
            CAVX =
                                     CAVYE
            ことイメニ
                       -01369
                                     CAVYE
                                                .:1097
                       -51349
-51717
-52574
-53672
-55345
            こともとこ
                                     CAIY=
            CAFA=
                                     C1VY=
                                                 .01739
            CAVX=
                                     CAVYE
                                                . 12442
            : A 4 =
                                     CAVYE
                                                -33270
           Cadx =
                       .06724
                                     CAVY=
                                                 .33509
           CAVAZ
                       . 38735
                                     CA44=
                                                .04251
.04747
                       •111 2
           CAVXE
                                     CAVY=
            ころみメニ
                       +13521
                                     CAVYE
                                                 .45553
                       •1==7é
                                     CAVY=
            = XVAL
                                                 .05361
            CAVAE
                                     CAVYE
                                                -27052
                       -23:55
                                                .07707
            CAVA=
                                     CAVY=
                       .27615
                                                 -38309
            CARKE
                                     CAVY=
           CAVAZ
                       -31+71
                                     CAVYE
                                                 .38342
                       .35395
                                                 ... 3298
           LAVX =
                                     CAVYE
            CAVX=
                       .39260
                                     CAVY=
                                                .69572
            CAVK=
                       .43033
                                     CTAA=
                                                 .07763
                       .46575
           CAVAE
                                     CAVA=
                                                 .10173
                       -51163
                                     CAVY=
           CAVXE
                                                 -10308
            IAWK=
                       .53450
                                     CAVY=
                                                -10372
                       .56621
                                     CTAA=
            CAVX=
                                                 -17373
           2248=
                       .59537
                                     CAVY=
                                                 -10315
                       .60381
.65111
           2178=
                                     C:YY=
                                                 -10235
                                                 .19366
                                     CAVY=
           LAVAE
            - A - A =
                       .67495
                                     CAVY=
                                                .69343
                       •69513
•72193
•74164
            CAVAE
                                     CAVY=
                                                 .: 9597
                                     CAVY=
            3 - V 4 =
                                                -29311
            = 14=
                                     CAVYE
                                                .08795
                       •76.34
•775.33
           CAYKE
                                     CATYE
                                                 .08518
           CAVES
                                     CAVYE
                                                 .03106
                       .795+2
            こみVx=
                                     CAVY=
                                                 -27749
            CAJK=
                       .81146
                                     CAVYE
                                                -07232
            こムイX=
                       .32535
                                     CAVY=
            CAIXE
                       .33773
                                                 .05343
                       •65151
            CAVKE
                                                 .05061
                                     CAVY=
                       -85713
                                     CAVY=
                                                 .04336
F(1)= -21910 408-95
F(2)= -18519 78-05
F(3) = -1309-225-05
F(4) = -22129515-05
F(5) = -27129515-03
F(5) = -1715/322-03
F(6) = -42179775-05
R(1) = -13278162-02
x(4)= +7165 3E+J1
x(3)= .5121fc65-11
x (4) = - 63344 422-01
4(3)= -.71-59995-11
                       ITERATION NOWE 2
x(1)= .1523+56F-02
x(6)= .9179420E+GC
                          38TA12= --3133581E+01 XKST= -7185326E-01
                     1
                          98fAv2= --31537575+31
98fAv2= --315414_E+01
                  1=
                                                       xKSI=
                                                                .71979J4E-01
                                                                 .7193644E-01
                  1= 3
                                                       MKSI=
                          587A42= -.3154697E+01
                                                                 .7200715E-01
                  [=
                  I= 5
                          88T4V2= --3135419E+91
                                                                 .7219869E-01
                                                        XKSI=
                          68TAN2= --3114295E+11
86TAV2= --3136919E+01
88TAN2= --3137490E+01
                  I =
                                                        YKSI=
                                                                 .7223444E-01
                                                                 .7238362E-01
                  I=
                                                        xKSI=
                                                        XKSI=
                                                                 .7255531E-01
                  := 3
                                                        x<SI=
                  į z
                      9
                          58TAV2= --3138554E+31
                                                                 .7274846E-01
                          33TAN2= -.31165546+41
38TAN2= -.31331466+71
88TAN2= -.31345126+01
                                                                 .7296197E-01
                  i= 10
                                                        YKSI=
                                                                 -7319422E-01
                  I= 11
                                                        XKGI=
                                                        AKSI =
                     : 4
                  1= 13
                           ESTANZ= -.31399636+01
                                                                 .7370993E-01
                                                        *KSI=
                                                                 .7399011E-61
                                                        XKSI=
                  := :4
                           397A42= --314.453E+61
                                                                 .7428289E-01
                  1= 15
                          237412= --314C334E+01
                          5874.2= -.314124:E+71
5874.2= -.3141552E+91
                                                                 .7458647E-01
                                                        XKSI=
                  I= 16
I= 17
                                                                 .7483899E-31
                  1: 13
                          EBTANZ= --3142.435+61
                                                        XKSI=
                                                                 -7521851E-01
```

÷

```
1: 13
                          :57442= -.3442417E+01
                                                          *KS1=
                                                                   .75543C6E~G1
                          307442= -.31+27776+91
                                                          AKSI=
                    3.0
                                                                    .7587064E-01
                          38TAV2= -.3143123E+C1
3ETAV2= -.3143454E+01
53TAV4= -.3143753E+01
                 [= ?1
]= 22
                                                          XKZIZ
                                                                    .7619924E-01
                                                                    .7652683E-01
                                                          YK SIZ
                                                          XKS1=
                          3574\2= -31+4343404

3574\2= -31+43446491

3574\2= -31+4546401

3574\2= -31+45714+01

3574\2= -31+457776+01
                 1= 24
                                                          xKS1=
                                                                    -7717090E-01
                                                                    +7748341E-01
                                                          RKSIZ
                    53
                                                                    .777870CE-01
                 := 27
                                                          AKSI=
                                                                    .7807978E-01
                                                                   -7935996E-01
                    29
                          $37442= -.31+52456+01
$37442= -.31+5+786+01
$57442= -.31+56516+01
                                                                    .7362580E-01
                 := 29
                                                          MASI=
                 i= 10
                                                          AKSI=
                                                                    .7837557E-01
                    31
                                                          AK ZI =
                                                                   .7910602E-01
                          .7932143E-01
.7951457E-01
                 1= 32
                                                          AKPIZ
                                                          XKSI=
                 .= 33
                                                          xKSI=
                                                                   .7768626E-C1
                 l= 35
l= 36
l= 17
                          TETANZE -.31+61666*11
EETANZE -.31+62676*01
EETANZE -.31+63176*01
                                                          *4SI=
                                                                    .7983544E-11
                                                                   .7996119E-01
                                                          *KST=
                                                                   .an06273E-01
                                                          XKSI=
                        10+3574516- = 21 ATEE
10+35745- = 25 ATEE
10+35746- = 25 ATEE
                                                                   .9013944E-01
                 := :a
                                                          *KSI=
                                                                   .8019065E-01
                1= 19
                                                          TIZXY
                                                          XKST=
                                                                   ·=021661E=0
                                  .Z= .141556+03

TO= .141656+33

SI= .141636+00

SC= .141636+00

SC= .141636+03
   40E'.U=
             *±89355*10
*±89355*10
                                                             YUPPER: .40355E-01
   KCENCE
             .c5915E+1:
   40110=
                                                              YJPPER=
                                                              *U20522
   401.0=
=0.30+
                                                                          -40355E-01
             .as935E+16
                                                              YJ3PER=
                                                                          -40355E-01
   ACENCE
ACENCE
             **59356*41
                                  32= -1416EE+07
                                                              YUPPER=
                                  32= .141626+13
52= .141636+13
52= .141636+0
32= .141636+0
32= .141636+0
52= .141646+0
32= .141648+0
             .659352+61
                                                              YUFPER:
                                                                           .40355E~01
             .c59336+01
                                                              YUSPER=
                                                                          -40353E-01
   (C£45=
   *C210= 003350+01
*C210= 003350+01
ACENO= 003350+11
                                                              ANSSES
                                                                           -40355E-01
                                                              YUPPERE
                                                                          -44355E-61
                                                              YUPERE
                                                                          .40355E-01
   x35\0= .U59155+3
                                                              -4035EE-0
   XCENG# .85935E+16
                                 22m +1+153E+30
m+6973926E+03
                                                                           .40355E-C1
P(I+d) = -25426612+32
P(I+d) = -15533546+3
P(I+d) = -+1675696+12
                                                        .27997575+00
                                                                             9.
                                                                                                    --85284016+00
                                                                                                                          -.1616584E+90
                                 --89142126+91
                                                                                                     .5113321E+00
.2490537E+00
                                                       +.7782136E+30
                                                                                                                          -.5617097E+CG
                                                       --6231763E+05
                                                                             --17426166+01
                                                                                                                          --2735910F+08
3(1.3)= -475449452+02
                                                       --34633785+09
                                                                                                     .9933269E+00
                                                                                                                          --10911326+01
*(1.4)= .45735665+72
*(1.4)= .14717535+.3
                                                                                                                          --1290137E-G
                                                       --1157957E+02
--2-21122E+01
                                                                             -1374004E+02
--7934365E+01
                                                                                                     -1174417E-G1
-7150947E+0G
こくじゅじりこ
                                                                                                                          --7855474E+CG
                                                             .65935
                       51432=
                                               ¥ 606=
                                                                       YCCC=
                    3.
.32.66
.0..71
.00281
         = AVA =
                                               0 • 0 • 8 5
         ZAVAZ
                                     CAVYS
                                                  .00252
                                                 .13478
.07748
          CAVXE
                                     CAVY=
         CAVX=
                      .03493
                                     CAVYS
                      .01172
                                     CAVY=
                                                 .1159E
         CAVAS
          CAVKE
                      .61719
                                     CAVYE
                                                  ..1490
                      ·02577
                                                  -21939
         CAVXE
                                     CAVY=
                                                  -02444
                      .03577
         CAVX=
                                     CAVY=
                      .05751
.05773
                                     CAVY=
         CAYX=
                                                  .03093
         CAVAS
                                                  .03512
          : XVX =
                      .ca743
                                     CAVY=
                      .11117
.13538
                                     CAVY=
          244 X =
                                                  ...4752
         CAVX=
                                                  -05558
         CAVX =
                      -16497
                                     CAVY=
         CAVX=
                      .2G258
                                     CAVY=
                                                  .07058
                                     CAVY=
                                                  .37713
          CAVX=
         CA/X=
                      .27544
                                     CAVY=
                                                  ...9314
                      .31524
         CATAS
                                     CAVYS
                                                  .20846
         CAVAS
                                                  +29313
                                     CAVYS
         - 1 445
                                     CAVYS
                      .39495
                                                  • 27576
                      .43063
                                                  .:3967
                      -46712
-51213
         CAVES
                                     CAVY=
                                                  -13177
         CALAS
                                                  +19311
+19375
                                     CAVYS
         CAVES
                      .53516
                                     CAVYE
         LAVKS
                      .30657
                                     CAVYE
                                                  .11375
                      .59521
                                                  -10317
         ---
          CAFAS
                      .65.44
                                     CAVY
         CAIXE
                                     CEVYS
                                                  -10047
                      +67517
         CAVX=
                                     CAVY
                                                  . 79343
                      .69544
         CAVX=
                                     CAYY=
                      .72"34
         CAVXS
                                     CARYZ
                                                  .09311
                                                  .69785
         CAVXZ
                                     CAVYE
         CAVES
                      .77256
                                     CAVYZ
                                                  -08207
                      .79569
         CAVX =
                                     CAVY
                                                  -37748
          544 X =
                      -81175
                                      344 Y =
                                                  -J7232
                      .840m3
                                                 +365+0
+85742
         CLIAS
                                     CAVYS
         CAYKE
                                     CAVYE
         CTAX=
                                      CAVY=
         L .. V # #
                      .45735
                                     CAVYS
                                                  .24336
```

```
F(1)=
        .464431:5-57
F(2)= --1507+750-.a
F(3) = --c525717E-17
F(4) = -.7135,105-5-
F(5)= -1157357F-13
F(a) = ~.33m6mc/E-us
X(1) = .1323576E-.2
       .7125433E-11
4(2)=
       ...217745-.1
ELEJA
X643= +33+41555+31
4633= +471979746+01
4(6)=
       .91333215+00
          Sxal(+1)= +13235735+00
          5x51..2)= .71363332-01
          SXSI(+3)= ++721794E-01
          5x31(+4)= +35441555-01
          SYSI (+5)= -47197974E-71
          $4$I(+6)= +3189721E+67
                             RANE VI
I= 71 SARC= 1.
                                                     CP= -.50C0700E+C0 BETAN= -.6571643E-01
CP= .977CB12E+00 BETAN= -.6553708E-C1
12 70 SARCE -57271812-03 KKX= -57146791-03 CPE
12 59 SARCE -14997612-02 KKX= -14998506-09 CPE
                                                           .3962424E+00 BETAN= -.6524828E-01
               -1499761E-52 XXX=
                                     -1496550E-02 CP=
= 3A £ 2 £ £ £ £
               -2574-31E-92 XXX=
                                     -2553933E-92 CP=
                                                           .7631730E+00 BETAN= -.6488494E-01
                                     .4045959E-02 CP=
I= 67 SARC#
               *4054578F-02 XXX=
                                                           .9313436E+CC 6ETAN= -.6446200E+01
.9992332E+00 6ETAN= -.6399016E+01
               .551 1234E-32 KAX=
I= 45 SARC=
                                     .5578450E-02 CF=
               -7319151E-u2 XXX=
                                     .7333901E-02 CF=
                                                           .9675777E+08 BETAN= -.6347788E-01
i= 45 SARC=
               -9152995E-02 AAX=
-9152995E-02 AAX=
-13195912-01 AAX=
-1336009E-01 XXX=
                                     .3144067E-02 CP=
LE SA SAFLE
                                                           -8586978E+00 BETAN= --6293226E-01
                                     -11133576-41 CP=
                                                           1 = 53
1= 52 SARJ=
                                     -1315914E-01 CP=
                                     .1532923E-01 CP=
                                                           .7558424E+40 BETAN= -.6115254E-01
   S1 SARC=
                                     -1757363E-91 CF=
I= 50 SARC=
               -1760664E-11 XXX=
                                                           .7459054E+03 BETAN= -.6052741E-01
               .1993253E-01 XXA=
                                     .1969331E-F1 CP=
                                                           .7236519E+00 BETAN= -.5989269E-01
.7118591E+00 BETAN= -.5925228E-01
E3842 PE E1
                                     .2226017E-01 CP=
               -2232363E-G1 XKA=
I= 38 SAPC=
                                     .2472=97E-01 CF=
.2722719E-01 CF=
.2977495E-01 CF=
               .247746FE-C1 XXX=
                                                           .57535942+GG BETAN= -.53608516-G1
I= 57 SARC=
                                                           .63291746490 BETAN= -.57564226-01
.66377506400 BETAN= -.57321766-01
.56333326400 BETAN= -.56683226-01
I= 56 SARC=
               .27279155-01 XXX=
               .29631162-01 xxx= .32425362-31 xxx=
IR 55 SARCE
                                     .3236495E-01 Cr=
I= 54 SANC=
                                     .7477234E-01 CF=
               .3505693E-01 AXX=
                                                           .64479705+CC BETAN= -.5605046E-01
                                     .3755276E-01 CF=
               .3772198E-01 XXX= .4091504E-71 XXX=
I= 32 SARC=
                                                           .6340239E+90 BETAN= -.5542516E-91
                                     .4 134223E-31 CP=
i= 51 SARC=
                                                           -6239429E+CS BETAN= --5480880E-01
La 50 SAPLE
               -4313399E-L1 44X=
                                     .+355714E-01 CP=
                                                           -5144750£+0C BETAN= --5420268E-01
                                                           -5036250E+00 BETAN= -.5360798E-01
-5972866E+00 BETAN= -.5302571E-01
1= 49 SARC=
                                     -4579417E-01 CP=
               -+56753CE-01 KKX=
1= 48 SARC=
               .4853509E-01 XYX=
                                     .4355034E-01 CP=
               -51-11501-01 AAX=
-54201712-01 AAX=
                                     .31322395-61 CP=
                                                           .5894362E+GC BETAN= -.5245680E-01
I = 47 SARCE
                                     -5413530E-01 CP=
                                                           -5629369E+00 BETAN= --5190203E-01
IR 45 SARCE
               .5716344E-01 xxx=
is $5 SARC=
                                     .5550730E-31 CP=
                                                           .5750536E+00 BETAN= -.5136209E-01
               .59914585-01 xxx=
AR 44 SAFCE
                                     -5971478E-01 CP=
                                                           .5634566E+00 BETAN= -.5083759E-01
               .0253322E-01 XXX=
                                     .5252981E-01 CP=
                                                           +5622173E+00 BETAN= -+5032964E-61
1 43 34RC=
   42 SARC=
               .654576GE-G1 XXX=
                                     -5535065E-01 CP=
                                                           -5553113E+0G BETAN= --4983690E-01
                                     -5817568E-01 CP=
is al SARCE
               -64256116-01 XXX=
                                                           .5507150E+00 BETAN= -.4936153E-01
               +71117275-01 XXX=
+73949746-61 4AX=
                                     •7133343E-01 CP=
•7333254E-01 CP=
I= 40 SARC=
                                                           -54540835+00 BETANE --4890325E-01
                                                           -5403715E+00 BETAN= --4846233E-01
      SARCE
                                                           -5355674E+0C BETAN= --48C3596E-01
-5310402E+0C BETAN= --4763332E-41
                                     .7656173E-01 CF=
               .76782275-31 xxx=
I = 36 SAPC=
. = 37 SARC=
               .7261374E-01 (XX=
                                     .7949267E-61 CF=
               .824431(E-91 #XX=
                                     +4131618E-01 CP=
                                                           .3267150E+00 BETAN= -.4724553E-01
1= 3c 34RC=
   35 34FC=
               .252474,E-0: 4KX=
                                     +>513935€-11 CF=
                                                           -52259831+00 SETAN= --4687567E-01
                                     .3795364E-01 CP=
.3077325E-01 CP=
               .65:91775-81 XXX=
                                                           .5136766E+07 BETAN= -.4652380E-01
[=
   73 SAFC=
               -9090940E-01 4XXE
                                                           -5149397E+GG 3ETAN= --4618994E-01
               .9372157E-11 #AX=
                                     .3358244E-C1 CP=
                                                           .511376CE+GO BETAN= -.4587406E-01
1= 32 Sanc=
   31 9490=
               .9552763E-01 xxx=
                                     .9638554E-01 CP=
                                                           .5079755E+00 BETAN=
                                                                                  -.4557620E-01
               .7x325645-01 Xxx=
.2r476735+07 Xxx=
.29091015+01 XXX=
      3442=
                                     .3318189E-31
                                                           -5046885E+90 BETAN= --4529624E-01
                                                     CP=
                                     .24-5225E+00 CP=
   29 5460=
                                                           -4341331E+00 BETAN= --4682966E-01
. =
I= 26 345C=
I= 27 54RC=
                                                           -4096958F+00 BFTAN= --5015210E-01
               .3617993E+00 XXX=
                                     .3614484E+30 CP=
                                                           -3968519E+C0 BETAN= --5354716E-01
               .421836 LE+28 XXX=
                                     -42144725+00 CP=
I= 26 S4FC=
                                                           -3891902E+00 BETAN= --5671953E-01
Im 25 SARCH
               **7172925+00 AXX=
                                     .+733022E+08 CP=
                                                           -3839676E+00 BETAN= --5962840E-01
               *51935225+00 XAX#
*56026041+00 XXX#
*59077075+00 XXX#
                                                           -3801824E+0G BETAN= --6229032E-01
A= 24 SAPC=
                                     -5139044E+08 CP=
   43 SARC=
                                     .3575734E+C0
                                                           +3772525E+0C BETAN= --6473385E-01
                                                     CP=
I= 22 SARC=
                                     .3752557E+C3 CP=
                                                           +3749057E+GG BETAN= -+6698714E-01
               .6301966+03 XXX=
.6608719E+33 XXX=
.6692123E+03 XXX=
                                     +5295574E+00 CP=
+5603089E+00 CP=
                                                           -3729680E+00 BETAN= --6907514E-01
L= 21 34FJ=
                                                           -3713497E+00 BETAN= --7101898E-01
      SARCE
                                     .559626RE+30
                                                           -3679755E+93 BETAN= --7283652E-01
I= 19 SARC=
                                                     CP=
               +71554525+00 XXX=
                                     .7147393E+50 CP=
                                                           +3688844E+40 BETAN= --7454273E-91
   le SARCE
               .74^1395E+39 X/X= .7632993E+13 KAX=
                                     .73951225+99 CP=
.75235146+88 CP=
1: 17 JAPE =
                                                           -3630244E+00 BETAN= --7615020E-01
                                                           .3674592E+C0 8ETAN= -.7766980E-01
L= l= SAKC=
               +76+9377E+84 AAX=
                                     . T842720E+90
                                                     CP=
                                                           -3673949E+00 BETAN= --7911082E+01
      3460=
               .H0548146+00 4xx#
                                     .3047957E+03 CP=
                                                           -3581574E+03 SETAN= --8079078E-01
               ACC497445+00 XXXX
                                     .3242129E+00 CP=
                                                           -3690764E+00 BETAN= --8364473E-01
   13 SARCE
               .:43:13:2+01 AXX=
   12 34°C=
                                     .3426248E+76 CP=
                                                           -3693959E+UC BETAN= --8688276E-01
      SARC=
               **=118135+0, **X=
                                     .2602831E+00 CP=
                                                           +3692383E+G0 EETAN= --9943366E-01
                                     .3776736€+63 CP=
1 =
      3-7-=
                41733496E+03 KEX#
                                                           +3685664E+98 BETAN= --9424662E-01
               +n741:07.5+66 44X=
                                     .4931354E+00 CP=
.3785040E+00 CP=
                                                           -3673532E+90 BETAN= --9827576E-31
7.3
       $15C=
               +309626II+
                             x / x =
                                                           -3654655E+CC BETAN= --1024650E+00
```

```
.92323136+Gu CP=
                                                                       -3629195E+G0 BETANE --1068408E+03
                                            .72327132730 CP-
.72735776*10 CP-
.72091666*00 CP-
.7549696*00 CP-
        $440=
                   497564525+10 4x45
                                                                       +3594371E+01 6ETAN= --1115140E+00
                                                                       -3551353E+03 BETAN= -.1158786E+00
-3494019E+00 BETAN= -.1265109E+00
      6 81454
                  *95229235+.u 44X#
        5440=
                  +2684046840u 448=
                  +978009UE+10 XXX=
                                                                       +3445695E+00 BETAN= --1251897E+00
                  +991115=2+10 AXX=
+1131591F+11 XXX=
1 =
        5 4 14 =
                                             .7954561E+05 CP=
                                                                       -3330276E+00 BETAN= --1298915E+00
                   1 3460=
                                                           .8877942E+00 CP2=
                               .2843615E-01 xxx2=
.3527441E-01 xxx2=
                                                                                      .95363736+00 8ETAN2= -313#8#8E+C1
.9131595E+90 8ETAN2= -3137546E+C1
.873-149E+01 9ETAN2= -3138210E+01
                 3 SARC2=
                    S43C2=
                   SARC2=
                               .4211257E-U1 XXX2=
                                                            -9014606E+66 CF2=
                                                           -9162863E+C7 CP2=
-9111120E+G9 CF2=
                               .4693640E=01 XXX2=
.5176+13E=01 XXX2=
.5579379E=u1 XXX2=
                                                                                      .83754765+00 9ETAN2= -.31386695+61
.80425695+70 BETAN2= -.31391225+01
.77364805+00 BETAN2= -.31394955+61
                    SARCE
                    SARC2=
                                                            .7151417E+00 CP2=
                    SARC2=
                                                                                      -776-4012-04 BETAN2= --3139962E-01

-776-1982-00 BETAN2= --3139962E-01

-726-7495E-00 BETAN2= --3140564E-01

-696-324E-10 BETAN2= --3140564E-01

-675-1435E-10 BETAN2= --3140792E-01
                               .59213446-31 XXX2=
.61405918-01 XXX2=
.6696035E-31 XXX2=
                                                            .9191713E+03 CP2=
            I= 10 SARC2=
I= 11 SARC2=
                                                            .9327536E+00 CF2=
                               .7327501E-31 YXX2=
                                                           .9296239E+G5 CP2=
.932911EE+00 CPD=
                    SARCE
                                .7356364E-01 XXX2=
            = 13 SARC2=
                                                                                      .6549034E+90 BETAN2= +.3141078E+G1
                                                            .9359855E+00 CP2=
                                                                                      .636:365E+90 BETAN2= -.3141342E+01
.618*795E+00 BETAN2= -.3141893E+01
                               .76537662-11 XXX2=
            I= 14 SARC2=
            I= 15 SARC2=
                    SARC2=
                               -8 252597E-51 XXX 2=
                                                            .9 41968 FE+00 CP2=
                                                                                       .6018006E+30 BETANZ= -.3141648E+01
                16
                   SARC2=
                                .6553327E-11 XXX2=
                                                            .9448791E+63 CP2=
                                                                                      .586:689E+30 8ETAN2= -.3142390E+01
.5714329E+00 9ETAN2= -.3142318E+01
                                                            .9476546E+00 CP2=
            := 19 SARC2=
                               .8433575E-u1 XXX2=
                               -71°-323E-01 XXX2=
                                                            .9554311E+00 CP2=
                                                                                      .5574493E+38 BETAN2= -.3142545E+01
            I= 19 SARC2=
                               .9374694E-31 XXX2=
                                                            .9533966E+0C CP2=
                                                                                      .5441630E+00 BETAN2= -.3142759E+G1
                    SARCL=
                               -9641465E-31 XXX2=
-9579535E-61 XXX2=
-1015563E+63 XXX2=
                                                            .9557525E+00 CP2=
.9583333E+03 CP2=
                                                                                      .5314969E+00 BETAN2= -.3142972E+01
.5193994E+00 BETAN2= -.3143175E+01
            I=
               21 SARC2=
            I= 22 SARC2=
I= 23 SARC2=
                                                            .9609042E+00 CP2=
                                                                                      .5077887E+00 BETAN2= -.3143376E+01
                                                           .9633920E+GU CP2=
.9633920E+GU CP2=
.9682937E+GG CP2=
.9682937E+GG CP2=
.9707075E+GG CP2=
                               +1545442E+06 XXX2=
                                                                                      .4966341E+00 BETAN2= -.3143569E+01
                    SARC2=
                                                                                      .48536686+00 86TAN2= -3143760E+01
.47546650+0G 86TAN2= -31437438+01
.4654002E+00 86TAN2= -31441246+01
               15 SARC2=
26 SARC2=
                               +11+3320E+31 XXX2=
+1.89459E+31 XXX2=
            7 =
                   SARL2=
                               *11135975+03 XXX2=
                    SARC2=
                               *1137'65E+00 XXA2#
*1160533E+10 XXX0#
*1160533E+00 XXX2#
                                                            .9735543E+05 CP2=
                                                                                      .4555838E+00 BETAN2= -.3144299E+61
               29 SARC2=
33 SARC2=
31 SARC2=
                                                           .97540126+03 CP2=
.97768636+13 CP2=
                                                                                      .4459949E+00 BETAN2= -.3144472E+01
.4361948E+00 BETAN2= -.3144639E+01
            *=
                               +1215237E+33 YXX2=
                                                            +9799715E+33 CP2=
                                                                                      -4273165E+70 BETAN2= --31448C4E+01
                               -12235126+11 RRK2=
-12237535+11 XXX2=
-1272516E+11 XXX2=
-1272516E+11 XXX2=
-12742446+11 XXX
            I= 31 94802=
I= 33 SARC2=
                                                                                      .4181231E+90 BETAN2= -.3144964E+61
.4089577E+J0 BETAN2= -.3145122E+91
                                                            •9821990E+01 CP2=
                                                            .7844266E+00 CF2=
                                                                                      .3997447E+00 BETAN2= -.3145274E+01
               34 SARCES
                                                            .9665994E+00 CP2=
               35 SARC2=
                                                            .9887722E+39 CP2=
                                                                                      .3903921E+00 BETAN2= -.3145425E+01
                               -13154392+00 XXX2=
-1335-345+30 XXX2=
                                                           -9906915E+73 CP2=
-9936111E+03 CP2=
                                                                                      -3807741E+00 BETAN2= --3145572E+C1
-37C7023E+00 BETAN2= --3145716E+C1
            7 =
               TE SARCE=
            1= 37 SARC2=
                               +13F7757E+01 XXX2=
+1377F39E+10 XXX2=
                                                           -9950763E+00 CF2=
                                                                                      .3598658E+03 BETAN2= -.3145856E+01
               Te SARCE
            L= 39 SAPCZ=
                                                           .9971416E+05 CP2=
                                                                                      .3476594E+08 BETAN2= -.3145994E+61
                                                           +9991414E+06 CP2=
+1001141E+01 CF2=
                               -1397938E+00 XXX2=
                                                                                      -33250915+00 BETAN2= --31461275+01
-29736465+00 BETAN2= --31462595+01
            I= 48 SARC2#
            I= 41 SARZ2=
            0011F=F0RCE/1/280+UINF++4
                                                       CLINF=
                                                                  .7545.285
                                                                               +60 CDINF= +2017576E-01
/= .
             4 = 403120916=04
4 = 49074614E=03
                                                      -8492576E-03
                                                 Y =
                                                       .2317521E-02
                                                 Y 2
                  -27125322-12
-59990945-12
-11713032-11
-17153572-1
                                                       -4781095E-02
             , =
             . =
                                                 Y =
                                                       .1397693E-01
             . =
                                                 Y =
                                                       +1+96487E+01
                  .25772755-01
                                                       -19793945-01
                  •3575759E=01
             x =
             ΥΞ
                  .5051277E-01
.67333855-01
                                                 Y ±
                                                       +3003030E-61
             72
                                                 Y=
                                                       +3512346E-91
             4 =
                  +37+9133E-11
                                                       .4265342E-01
             ¥ =
                                                       +4951793E-01
                                                 Y =
             Y =
                   •1333619E+06
                                                 72
                                                       -5557795E-01
             y =
                  .1559743E+u:
                                                  Y=
                                                       -5366164F-01
                  .2025774E+AA
                                                       .7057717E-C1
                  -2386309E+49
                                                       .77129F2E-01
             12
                                                 7=
                   .2764372E+00
             / ±
                                                 7 =
                                                       .8314294E-01
                                                  Y =
                                                       .8347539E-01
             4 =
                  .2152376E+09
                  .35429335+33
                  .39295275+15
                                                  YE
                                                       .96764625-01
             4 =
                                                       .93467455-01
             . =
                   .43365152+3.
                                                 Y =
                  .45712382+33
_E7199572+61
                                                       +1217661E+C2
             * 2
                                                  Y 2
                                                       -13310696+00
             4
                   .53516342+1:
                                                       +1337473E+G0
                                                 Y=
             72
                   .56636815+11
                                                  Y =
                                                       -10374805+10
                   -59521+25+33
                                                       +1331673E+F
             4 =
                                                       .1920563E+63
             1 =
                   .65"4383E+1"
                                                  7=
```

+9244540E+14 AXX=

+/2 // Y# +/3946 ## +/2 // Y# +/3946 ## +/4// Y# +/3946 • 3. .. 7 2 ¥ I , : 7= 7 = 4 = 12 v = v = 4 2 . 175, .116, , : ¥ = 7 = X = 7 2 . . Y = .. 2135 1 = •12211 •,2313 -24 11 -25 22 -272 1 -37 22 -34 2 -35 2 -37 2 -47 2 -7 ¥ = . 2411 . 2= ,= , , YI A I 7 = 4 2 ¥ = * = 7= .. ? 2 3 4 Y = 4 2 -- 27=A . 2:49 ..2329 ..3 23 # 2 4 2 ¥ ± " = 1: 7 = 7 = 7 = 1011 1 z * = 72 . = ۷ ټ ..3541 . = ¥ = •.] •.1 •] •53 ▼= ٠: 1= . . 35 13 X Z Y= · *** 55 ..3645 ..3545 . = Y 2 ¥ = 73 . = Y = •13754 •17796 " Y = Y = **K**= ..3335 .1572 .1390á 4 = x = ۲z 4 = YZ 1= ...3939 . 3970 ...3996 ¥2 X = YZ 4 = Y = • 4119 • 4136 ¥ s ۲÷ Y= Y= 4 = X = X = -4-55 -4-55 -14-55 XI ¥z •74 ... /= YZ Yz •9e ... X Z 4.5 A Z YZ

```
-1323585-12 -7186435-01 -4;21795-11 -33444555-01 --7198975-01 -9130025+06 -10116905+01 --11457455-0
-39.11e66.1 --129.315feu.

-375.0916.11 --1251376.1.

-36560066.1 --1251376.1.

-35225236.11 --11337555.11
 •33:4452E+/- -•111314uE+)
 .3234545E+11 -.Lua(#u61+17
.3036261E+0, -.1024c575+0
 .3941du.E+1. -.9627576E+11
.7135+e28+c. -.7+5+27*6+01
-34-425usim 1 meinesiu28m/1
-24-311nim 1 mei7321765mul
 *2727=1+6+u1 +*5796+226+u1
-271791959-1 -57798-2259-1
-27179959-1 -596913515-1
-27121875-1 -596913515-1
-27121875-1 -597913959-1
-17346458-1 -597367915-1
-1734915-1 -597367913-1
-11126158-1 -597362595-1
-11126158-1 -597362595-1
-11126158-1 -5973659135-1
-11126158-1 -5973659135-1
-11126158-1 -5973659135-1
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-11126158-1 -5973659135-1
-11126158-1 -5973659135-1
-11126158-1 -5973659135-1
-11126158-1 -5973659135-1
 +2674x 512-02 -+646c494E-.
 -1-997e16-,2 --552e6286-31
 ·5727181E-33 -.65537085-31
                      ---5716435-11
 ١.
 -2343mimE-31 --3136a686-71
 .3527001E-01 --3137*06F-01
 +378234+6- / -+139-425+31
  -1140541E-01 --31401451-71
 .65364176-u1 -.51435346+11
```

1

```
-7027601E-31 --5141772E-71
-715=3e+1-1 --314179E-31
-70537=6E-31 --3141342E-31
-7711=5E-11 --3141342E-31
-7711=5E-11 --3141342E-31
-7711=5E-11 --3141342E-31
-752097E-11 --3142313E-31
-753007E-31 --3142343E-31
-753007E-31 --3142343E-31
-753007E-31 --3142343E-31
-753007E-31 --3142343E-31
-753007E-31 --3142343E-31
-753007E-31 --3143763E-31
-753007E-31 --3143763E-31
-753007E-31 --3143763E-31
-753007E-31 --314634E-31
-753007E-31 --314634E-31
-753007E-31 --314634E-31
-753007E-31 --314634E-31
-753007E-31 --314634E-31
-753007E-31 --314637E-31
-753007E-31
-753007E-31 --3146337E-31
-753007E-31
-753007E-31
-753007E-31
-753007E-31
-753007E-31
-753007E-31
-753007E-31
-753007E
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5.0 LISTING OF PCASE

```
. SUCTIALLY PARTIALLY CAPITATING CASCADE CALCULATIONS.
   5/17/1973 PROGRAMMED BY D. FURLYA.
      DIMENSION 73E(5)*xZ(5)*BETA*O(513)*BETA*O(513)*BETA*O(513)
      DIMENSION SX$1(6),XXX(513),2P(513),INT(10),XCP(5),YCP(5)
      DIMENSION FL(200)+F3(200)+C2(101)+XXX2(201)+FL2(100)+F32(100)
      CCYYOUXX/GME_IOT/FCPCC
      COMMON/UPPER/AZAAJ.3233U.CZCCJ.AAAAJ.BBBBJ.CCCCCJ.AASJ.BBJ.CBU.ADBU
      COMMON/FREEDAY/XFREED, YFREED
      COMMON/DELTAD/DELT(5.5)
      COMMON YCCC+SBETA2
      COMMON XITM(200) + XITM(200) + ANSG2S(200) + SARC2(200)
      COMMON CAVEGOOD +CAVEGOOD + SETAB + SETAC + XCCC + NCAV + LPMM + NS2
      C001)2VAT36+(0C1)2VAT86+(0C1)VAT66+YCnOV+SAF61+(0C1)UA VCPPCO
      COMMON FLAPANADELTA-DSAP-ALFA1-SAMMA
      COMMON SIGMA.SBETA.XXM.ICPI.SARCOD(513)
      COMMON IDJL+XA+X8+XC+TANG+EP+YC+YR+JBIGS+XLBIGS+BIGS+BALS+DSS
      CJM4ON XSN(6).CCC1.CLE.ERC.YYY.XM.ITERA.SXSIO(6).FSXSIOC6).YY5(6)
      COMMON PSIZOLPOSARC(513) SARCO(513) LPMODE
      COMMON BETAN(513) + BETAN(513) + IJ+LPK + XII(200) + XJJ(200) + XDX
      COMMCV XROUND.A2AA.3233.C2CC
COMMON AAAAABBBACCCCAABABBACBACBATBAUS(100)AAGAUS(100)ANGAUS
C BETAV----FOR ARC 1 FOR REGULAR INTEGRALA
 BETAN IS FOR INTERPOLATED VERSION OF BETAN .
BETAN2 FOR EQUALLY SPACED INCREMENT FOR ARC 2.
I BETANZ FOR CHEBYCHEV- GAUSS VERSION OF BETANZ.
                                                                HT/KEIHT/NO4400
                                                            ECAPSE ) 095.5 ( DAER
                                                          ECAPSE 10885.60 ETIRA
                       )4.35.+----SVICAPS _EDCY EXAW NEPD-----.XG1( TAMROF 0885
      PAI=3-141592653
      READ(3,795) NGAUS
      NGAJS1=NGAJS+1
      VVV2=V3AUS/2
      1+54%V=$2LAEV
      READ(5.560) (TGAUS(I).I=NGAUS2.YGAUS)
      READ(5.560) (#GAUS(I).I=NGAJS2.NGAJS)
      33 26 13=1.4NN2
T3AJS(12)=-T3AJS(46AJS1-12)
   (GI-12LARN) SUAF .= (CI) SUAF L 25
      ARITE(6.561) (TGAUS(I).I=NGAUS2.NGAUS)
      #RITE(6+552) (#GAUS(I)+I=NGAUS2+NGAUS)
  550 FORMAF(4F20-10)
  351 FORMAT(1x++T(I)=++10(F10+8+1x))
      READ (5+590) XXM
      20 589 IDELTA=1+6
  539 READ (5.590) (DELF(IDELT4.I).I=1.6)
  352 FORMAFCIX. + 2 (I) = + . 10(F10.8 . 14))
                                                                                      c
      READ (5.560) TH. XXDD. YYDD
      REAC(5.560) R.AAAA.3339.CCCC
       8C+63+86+64 (026+63+08
       READ(5,560) XROUND+4244+3233+0200
       READ(5.560) AAAAJ.8333J.CCCCJ
       L80+U83+L8E+U8A (C82+E) CA38
      LISSOLEESE-LAASA (CEST) CASS
      REAC(5.795) IFLAGI . NCHBY
```

PROGRAM PCASE(INPUT.JUPUT.TAPE5=INPUT.TAPE6=OJTPUT.TAPE7.TAPE1)

```
READ(5.1321) SBETA .SBETA2.SF4.BETA3.BETAC
           READ(5.551) LPMS.LPKS.LPM2.IFLAG.IREAD.ISHARP
           NEW TIXAP (CICE + RETIN (105 - C) CAR
           SEAD(5.202) ALFAIS.SATTAS.SJLIS.
           READ(5+229) DE+0G+0=
           33 592 IDE_TA=1.6
   592 ARITE (6,591) (DELTCIDELTA-1), I=1,6)
           #RITE(5,6553)
 5533 FORMAT(IH1)
           L80+U82+U86+U84=00YY
           481FE(5.5395)xx33.Y(33
 SASE FORMATICEDX +* X AND Y COORDINATES OF JPPER BLADE END PCINT=++1H(+
         € #7.5.1H...#7.5)
           #RITE (6.5690) T→.XX4
           #RIFE(5,5531) BET49,3ET4C
           #RIFE(6,555) R,4444,3333,0000
           #RITE(5,556) A8,88,23,06
           2223 - EESE - AASA - CVUCFX (768 - 633 1 F F
           ARITE (6.523) AAAAU.3988U.CCCCU
           #RITE(6,524) A8J,38J,08J,08J
            #RITE(6,525) A2AAU,323BU,C23CU
           ARTIE(6.1229) LPMS. P(S. SEETA. TREAD, NCHBY
           #RIFE(6.1324) DE-DG-DF-8F4
            ARITE(6.1521) SBETA2
   590 FOR4AF (8=10.8)
   591 FORMAT (10x++)ELTA(1+J)=++6(F10+8+2X))
 5530 FORMAT (20%+FHICKNESS OF PLAND CONVEX FOIL = ++F10.5+10x++X4=++
         1=10.5)
    525 F3R4AT(20x+*A2AAU=++F10+5+2x+*3283U=++F10+6+2x*C2CCU=++F10+6)
   555 F3R4AF620K++R=+,=5.2,2K++444B=+,=10.5,2X++5383=++F13.5,2X++CCCC=++
         XF10.63
   355 FORMAT(20x++48=++F10+5+2x++38=++F10+6+2x++C9=+++T10+6+2x++08=++F10+
         x 6 )
   517 FORMAT(20x+*X3UN3=*+F10+6+2x+*42AA=*+F10+6+2x+*62B3=*+F10+6+2X+*C
         x2CC=*+=10-4)
    523 =3R4AF(20x,*AAAAU=*,=10.6,2x,*35EBU=*,F10.6,2x,*CCCCJ=*,F10.6)
    524 F3R4AT (20x+*A8U=*+F1]-6+2x+*33J=*+F10+6+2x+*C3J=*+F10+6+2x+*D5U=*+
        1 F10.6)
     PIFLAGY+++++FLAS=1 FOR THE FIRST RUN & IFLAGED FOR PREVIOUS DATA USE.
  I=LAG1=0 FOR RESULAR RUNS. IFLASINEGEDR RUNS OF READING DATA FROM CASCLIM.
  I: IFLAGINE . O NEED EXFRA DATA FOR SXSI(2) AND SXSI(3).
    (GIIE)TAPRC= EET
  A111.000 CAA KADA WASTA ON STATES ON STATES CONSTRUCT CANDON CALLED CATER CALCULATED FROM SERVICES AND CALCULATED FROM SERVICES CALCULATED FROM SE
  43+38+C8 AND DS ARE COEFFICIENTS FOR POLYNOMIALS FOR X GREATER THAN +8.
 HEYER THAT IS AND USE AND USE THE SAME AS ARAB ETC... EXCEPT THEY ARE FOR THE USER FACE OF THE FOIL

CANDO COURT AND COURT OF THE FOIL

CANDO COURT AND COURT OF THE FOIL
2 SEA IS USED FOR DETERMINING WHETHER TO CALCULATE BETA.
  1321 FORMAT(5E14.7)
  IRLASES NEEDS DATA CARDS FOR SXSIGID, IRLAS, IREAD MAY BE SET TO 5.
I IF IFLAGED . DATA WILL BE READ EITHER FROM
                 BATA CARD, IF IREAD=5
                  TAPEL
                                    . IF IREAD=1.
   331 FORMATCIOIS)
   231 FORMAT(413)
    232 #3R4AT64E14.73
C DEVOCATE THE INCREMENTS FOR DERIVATIVES IN DXFNEW.
```

```
1 03=1.6-3 $ 0F=1.6-5 ARE JSED BEFORE.
229 FDR4AT(3E14.7)
 1229 FORMAT(5X,4HLPM==14+2X,4HLPK=+14+2X,6HSBETA=+114+7+5X+6HIREAD=+11+
     x2x++NC+5Y=++13)
 5551 FORMAT(20x++8ETAB AND BETAC AS FIRST GUESS=++F10+5+2K+F10+5)
 1324 FORMATCICX.3HDE=.E14.7.2X.3HDS=.E14.7.3HDF=.E14.7.2X.4HSF4=.E14.7)
 1521 FORMAF(10++*53EFA2=++514+7)
      SBETA2=SBETA2+PAI/133.
      3ET48=8ET43+P41/180.
      SETAC=BETAC+PAI/18G.
3 .944=L942=VS2
      _244=_242
      452=L342
       . 2441= . 244+1
       WRITE(6+1489) LPM2+ISHARF
 1439 FORMAT(10x,+LPM2=++13,2x,+15444P=++E14+7)
C ISHARPEC FOR SHARP L.E.
COUNTY FOR PORT L
      SBETA=SBETA+PAI/180.
      DO 999 IUKL=1.NITER
S FFF4 IS PROVIDED FROM DERVEH. BUT IF THE LOOP DOES NOT SO THROUTH IT. FFF4 OF PRESET VALUE MUST BE USED.
      FFF4=0.
      ALFAID=ALFAIS
      SAPPAD=GAPPAD
      SILID=SOLIS
      SIGNA=SIGNS
      IF(VHC.EQ.1) 30 TO 240 IF(VHC.EQ.2) GO TO 241
      I= (NH<.EG.3) SU TO 242
      SI34A=SIG4S-0.01+FL34T(IJ<L-1)
      30 TO 243
  2+2 SOLID=SOLIS+0-1+FLO4f(IJKL-1)
      30 TO 243
  2+1 3AMMAD=GAMMAS+2. += LJAF(IJ(L-1)
      GO TC 243
  240 ALFAID=ALFAIS+2. +FLJAT(IJKL-1)
  243 CONTINUE
      X4=XX4
       ALF41=ALFA10+PAI/13).
      DSAP=1./SOLID
       GAMMA=GAMMAD+PAI/16J.
      DELTA=ALFA1+GAMMA
       F_APAN=0.
      GITE(6.665) ALFAID. GAMMAD. SOLID
  555 FORMATEIX. ISHINCIDENCE ANGLE#. E14.7.1x.6HGAMMA=. E14.7.1X.9HSOLIDIT
     XY=+514+7)
       WRITE(5+653) FLAPAN
  SSS FORMAT(SX-11HFLAP ANGLE--214-7)
      STOLL=2.E-4
       STO_S=5.E-4
       ERC=1.E-2
       C_E=1.E-4
.SIZS CVA .AMEIZ=.OV .TIVAC C
       WRITE(6+511) SIGMA
  511 FORMARCICK+114CAVIT- NO =+E14-7)
      CCC1=4LCG(1.+SIGMA)/(2.+PAI)
I SPECIFY HYDROFOLITS CHARACTERISTICS AND SEP. POINTS.
       XC=G.
       YC=0 .
```

```
x3=0.
              X4=1.
              GCYY-CCXX-C-CX+CX+AX (S02+6)
     502 FORMATC107.6HCHORD=,E14.7.2X.17HUPPER SEP. POINT=,E14.7.27.20HCONN
           x = PDINT(XD+YC)=(+614-7+1H++614-7+1H)/* XXDD=*+*10-6+2X+*YYDD=*+
Y =10-6)
C STARK ITERATIVE PROCEDURE.
              ----BASIC FLOW IS MAT OF FLAT PLATE-----
STITERAT IS INDEX FOR NUMBER OF ITERATIONS.
              ITERA=1
              IF (IFLAG.EQ.O) ITER4=2
              3165=0.
              XHI3H=0.
              X_U#=0.
             15112=0
             XINCRT=XA/50.
             JJ 243 IIVC=1,50
              XLC#=XHIGH
              XHIGH=XLOW+XINCRT
              CALL ARCLEV(S+XLO++XHIGH+IS112)
    248 EIGS=BIGS+S
             #RITE(5,534) BIGS
    534 FORMAT(10X.5HBISS=.E14.7)
             ST0_=1.E-5
             LPM=LPMS
              _ > K = L > K S
             L241=_P4-1
              _PM3=LPM-3
I IDPI IS USED FOR CONTROLLING PROGRAMS O FOR ITER. I FOR THE REST.
   FIND XSIB.XSIC.XSIF.A.ALFA2 BY JSING NEWTON-S METHOD.
 2 3451(1)=X$13
   SXSI(2)=XSIC
   S(SI(3)=XSIF
   SKSI(4)=A #HICH IS THE COEFFT. OF MAPPING FON-
C 3(SI(5)=A_F2
CMESTREAM OF STACE CALLS OF STACE OF STACE OF UPSTREAM AND CONTROL OF STACE OF STACE
              IF(IJ(L.GE.2) GO TO 530
              IF(IFLAG.E2.0) 30 TO 761
I INATIAL GUESS FOR SXSI(I) IS -----
             READ(5,769) SXSI(1),5xSI(2),5xSI(3),5XSI(4),5XSI(5),5XSI(6)
             30 TO 150
O THIS IS THE CASE THAT OLD DATA ARE USED WITH PUNCHED CARDS.
    751 CONTINUE
              IF(IFLAG1.EQ.0) 60 TO 779
              READ(1,620) SXSI(1), SXSI(2), SXSI(3), SXSI(4)
              SXSI(5) = SXSI(3)
              READ(5,779) SXSI(2),5XSI(3)
    778 FORMAT(2514.7)
             33 TO 529
    1773 (6) 12x2, (4) 12x2, (4) 12x2, (2) 12x2, (1) + Sx1(1) + Sx1(4) + Sx1(4) + Sx1(5) + Sx1(5)
    620 FORMAT(6E13.6)
    529 DJ 621 IC=1.LP4
    521 READ(IREAD, 522) SARC(IC), SETAY(IC)
    522 FORMAT(2E14.7)
             33 1621 IC=1.LPMM1
  1521 READ(IREAD+622) SARCE(IC)+3ETANE(IC)
             IFEIFLAG.EG.O) GO TO 480
             GO TO 481
    430 DD 482 IBT=1,LP41
    432 BETAM(IBT) = . 5 + (BETAN(IBT) + BETAN(IBT+1))
```

```
431 CONTINUE
       150 ICPI=0
                   WRITE(6.102) ITERA
       (SI+=+CV VCITAFSTIP+1+101)TAPRCT SC1
                   30 650 IRP=1+6
       SED SESTOCIRP)=SESTOR
                   IF(ITERA-GE-2) STOL=STOLS
                   IF (ITERA-EG-MSTOP) STOLESTOLL
......
                   CALL DXFNEW(SXSI,STDL, MAXIT, ITN, DG, DF, FFF4)
       SUFFICE DES
                   20 537 101=1.6
                   XSV(IJ1)=SYSI(IJ1)
       537 WRITE(6.536) IC1.SXSI(IC1)
       536 FORMAT(10X+5HSXSI(+11+2H)=+E14+7)
                   CSPACE=(1.+SXSI(1))/FLOAT(LPK)
                    +CSPAC=G.5+CSPACE
                   FSPACE=CSPACE/FLDAT(LP4-LPK)
                   SCAGE ** SPACE
                   KBET==1.+CSPACE+FLOAT(LPK-1)
                   ICPI=1
C IOPI=0 =04 FINDING SXSI(I) + I.E. + SXSI(I) = YXS(I) ≥ IOPI=1 FOR THE REST.
C TALULATION OF PRESSURE DISTRIBUTION fC?1.
IF(ITERA.∈2.1) SO TO 36
                   33 35 IB=1+LP4
         35 BETANOCIB) = BETANCIB)
                   33 37 I3=1+_P41
          57 BETAMO(IB)=BETAM(IB)
      355 357402(13) = 357402(13)
          34 CONTINUE
                   JJ2=CJS(A_FA1+GAM4A)/CJS(SKS1(5)+GA44A)/SXSI(6)
                                                                                                           ) AMMAG+) 5(ISXS(SOC/) AMMAG+1 AFLA(SOC=2UJ
                   JJ22=JJ2**2
                   00 25 _G=1.LP4
CPICAL CONTROL OF THE FIRST WEST OF THE FORT THE
                   LP=1 IS NEAR THE T.E.
                   LP=LP4 IS NEAR THE L.E.
LF(LP.EQ.1) GO TO 521
                   I=(_P.EG._P4) GD TD 52
                   22=EXP(XITY(LP))
C XITYOI) IS CALCULATED IN DESIME OF DXENEW FOR F(4).
                   32=32++2
                   CP(LP)=1.-UU22+Q2
                   33 TO 522
         52 CP(LP)=-SIGMA
                  30 TO 322
       521 CP(LP)=1.-JJ22
      322 CONTINUE
25 CONTINUE
```

```
EUNITHOC 431
                                                                                                                                                                                                         .0=) MP_(PC
                                                                                                                                   )3+021X+PCY+PCX(NEKTIA=)1-MPL(PC
                                                                                                                                   )3.911x.PCY.PCX(NEKTIA=)2-MP_(PC
                                                                                                                                                                           ECAPSF-11(ISKS=021K
                                                                                                                                                                  ECAPS=+.2-)1(ISXS=911X
                                                                                                                                                                                                          . 0= )4( PCY
                                                                                                                                                                                     )3-MPL(PC=)3(PCY
                                                                                                                                                                                     ) 5-4PL (PC= )2 (PCY
                                                                                                                                                                                     )7-4PL (PC=)1(PCY
                                                                                                                                                                                          )1(ISXS=)4(PCX
                                                                                                                                                               ECAPSF+.2+)2(PCX=)36PCK
                                                                                                                                                               ICAPSF+ . 2+) 1 (PCX= )2 (PCX
                                                                                                                                                            ECAPSF + . 7-)1(ISXS=)1(PCX
                                                                                                                                                            431 OT DG )1.GE.ARETI(FI
Connected and AIN INSERT 1 - connected and a connected and 
0----- FOR THE SECOND ARC S2-----
                           NUMBER OF CONTROL POINTS ON S2 IS FIXED IN SUBROUTINE DESIMES I.E. . HALF OF THE POINT USED FOR BETA ANSOES IN COMMON = 52.
                  20 550 NC? = 1+2441
IF(NCP+EG+1) 50 TO 581
                  IF (N3P.E2._P441) 93 FD 682
                  G2 = EXP(ANSG2S(NCP))
                  32 = 32**2
                  CP2(NCP) = 1 -- Q2+UU22
                  30 TO 680
      531 C22(NC2) = -SIGMA
      53 TO 680
532 C22(NC2) = 1.-JJ22
      530 CONTINUE
C++++++++++AIN INSERT 1+++++++++
                  A=4=A35(F==4)
                  IF(AF4.38.SF4) SO TO 1135
                  30 TO 1134
  1135 #RITE(5+1136)
  1135 FORMAT(5x++F(4) IS TOO LARGE TO CALCULATE BETA+)
                  2122
C FIND XXX (XSIP) FIRST.
  1134 CONTINUE
                  IS1S2=0
C----FIRST BETA FOR ARC 1-----
                  33 100 LLP=1+LP4
                  L3=_P4-LL3+1
CAL_ 333ETA(XYX+3ET4+1S1S2)
                  XXX(L>)=XYX
                  BETANGLP)=BETA
                  IF (LP-EG-LPM) BETAB=BETA
                  IF(ITERA-LE-MSTOP1) SO TO 100
WRITE(5-101) LP-SARC(LP)-XXX(LP)-CP(LP)-BETAN(LP)
     130 CONTINUE
```

```
131 F3R4Af61Ke24IFe13e1Ke54SARC=eE14e7e1ke44XKK=eE14e7e1Ke34CP=eE14e7e
           X1X+6H8ETAN=+E14+7)
SARCZ HAS BEEN CALCULATED
CVA 54124C ENITURORED IN
                             STORED IN COMMON AREA.
             IS152 = 1
             00 429 LLP#1+LPMM1
              __=___
              CALL 333ETA(XYX.BET4.IS1S2)
              IF(LP.EG.1) BETAC=BETA
              XXX2(LD) = XYX
              BETANZ(LP) = BETA
             IF(ITERA..E.MSTOP1) 33 TO 329
              #RITE(5+239) LP+SARC2(LP)+X(X2(LP)+CP2(LP)+SEFAV2(LP)
    259 FORMATC9x++I=++I3+1X++SARC2=++E14+7+1X++XXX2=++
           *E14.7.1x.*CP2=*.E14.7.1X.*3ET4N2=*.E14.7)
    329 CONTINUE
    429 CONTINUE
Constructed INSERT 3 Address and a constructed a
S FIND LIFT AND DRAG.
USID = SINCELTA)
             J200 = C05(3E_TA)
             UXE = SXSI(4)+UCOD
             JX92 = UX3**2
             00 165 ITK = 1.LPM
1*(ITK.GT._PK) 30 T0 105
             XPS = -1.+CSPACE+FLDAT(IT(-1)
             30 TO 108
    135 XPS = XBET+FSPACE+F_3AT(IT<+LPK)
    103 CONTINUE
              JXA = XPS-SXSI(4)+JSID
             UXA2 = UXA**2
             PXXP = UCDD/(JXA2+UX32)
             DWDX = DGAP+PKXP+KPS/PAI
             COBET1 = COS(BETANCIT())
             SIBET1
                                      = SIN(BETAN(IT<))
             DS1DX = -EXP(-XITY(IT())+DWDX/UJ22
             SI IS CALCULATED AT DESIME AS XITY(I).
              . WCPPCD IN COMMON.
             IF(XPS.LT.0.) OSIDX = -DSIDX
             XLP1 = DS13K+CP(ITK)
             FL(ITK) = -XLP1+COBET1
             *3(17() = x_P1+SI3EF1
    105 CONTINUE
C----CL AND CD FOR S2 PART.
             NS21=4S2+1
```

```
VS2A=VS2-1
      SAP2 = (S(SI(3)-S(SI(2))/452
      DJ 338 ITK = 1, NS21
KRS2 = SXSI(2)+3AP2*(ITK=1)
      CIZL+(4)IZXZ-SZFX = AXU
      UXA2 = JXA++2
      PXXP = UCDD/(UXA2+UX32)
      DADX = DGAP+PXXP+XRS2/PAI
      COBET2 =-COS(BETAN2([f())
      SIBET2 =-SINCRETAN2(ITK))
      DS2DX = EXP(-ANSG2S(LT())+D4DX/JJ22
      G2 IS ALREADY CALCULATED AT OFSIM5 AS
      .ABFA VCMMCC VI GEROTZ .(I)2562NA
      X_2=0S20X+C^2(IT4)
      =_2(IT<) =-x_P2+C38ET2
      F02(IFK) = X_P2*S13EF2
  338 CONTINUE
      SPACE = CSPACE
      CLIFT = C.5+CSPACE+FL(2)+0.5+FSPACE+FL(LPM1)
      CDR4G = 0.5+CSPACE+FD(2)+0.5+FSPACE+FD(_P41)
      00 111 IUA = 2.LP43.2
      IF(IJA+SE+LPK) SPACE = FSPACE
      CLIFT = CLIFT+5PACE+(FL(IJA)+4++FL(IJA+1)+FL(IJA+2))/3+
  111 CDPAG = CDPAG+SPACE+(FD(IJA)+4.*FD(IUA+1)+FD(IUA+2))/3.
      321 1J4 = 1+452A+2
      CLIFT = CLIFT+GAP2+(FL2(IUA)+4.*FL2(IUA+1)+FL2(IUA+2))/3.
321 CJRAG = CDRAG+GAP2+(-)2(IJA)+4++F)2(IJA+1)+F)2(IJA+2))/3.

-----ADC THE FORCES ON CAVITY PORTIONS.

SJERJJINI XCYC CALCILATES
    THE POINT ON THE JPPER BLADE PORTION CORRESP. TO THE CAVITY END POINT.
      CXA=XCCC
      CYAFYIC
      CALL XCYC(XCCSB, YCCSB, CXA, CYA)
      CLIFT = CLIFT+SIGMA+<CCCB
      CORAG = CORAG+SIGMA*YCCCB
CHIPT-XCCC AND YCCC ARE THE END POINTS OF CAVITY, CALCULATED IN SUBTRICTIVE CAVITY
      STORED IN COMMON.
C FIND BINE IN 2-1.
      UZU1=CDS(ALFA1+3AMMA)/COS(SXSI(5)+GAMMA)/SXSI(6)
DDHN=DDS(ALFA1+3AMMA)+COS(SKSI(5)+3AMMA)/SXSI(6)
      31NF=0.5+SIN(AL=A1+SXSI(5)+2.+G4MMA)/DOWN
      BINF=ATAN(1./BINF)
      AINF=3.5+PAI-BINF-GA44A
C COSTAR AND ALSTAR ARE BASED ON VELOCITY AT UPSTREAM INFINITY IN (X.Y).
      COSTAR=CORAG
      CLSTAR=CLIFT
      JINF=0.5+S2RT(1.+U2J1++2+2.+U2J1+COS(ALFA1-SXSI(5)))
      FINF=2.+DGAP+SIN(AL=41-SXSI(5))/(UINF+COS(SYSI(5)+GAMMA))
      CLIVF=CLSTAR+COS(AIN=)-COSTAR+SIV(A[NF)
      CDINF=CLSTAR+SIN(AINF)+CDSTAR+CDS(AINF)
      CLINF=CLINF/UINF++2
      CDINF=CDIN=/UINF++2
 HRITE(6.117) CLINF.CDINF
117 FORMAT(1x.39HDLINF OR CDINF=FORCE/1/2RC.UINF++2.5x.6ACLINF=,E14.7,
```

```
X1X+6HCDINF=+E14+7)
              WRITE(6.119) FINF
     113 FORMATCIX.3 AMFINE IS DETAINED FROM MOMENTUM E2N.5HFINF=.E14.72
               #RITE(5+221)
     221 FORMARCIX.494---COLL & CODD ARE BASED ON UI IN ALFAI DIRE.---)
              CCLL=CLSTAR+COS(ALFA1) -CDSTAR+SIN(ALFA1)
              CCDD=SLSTAR+SIN(ALFA1)+CDSTAR+CDS(ALFA1)
              ALOD=CCLL/CCDD
              #RIFE(6+191) CC30+CC__+AL33
     131 FORMAT(1x+5+CCDD=+E1++7+1x+5+CCLL=+E14+7+1x+4+L/D=+E14+7)
              4STOP1=MSTOP-1
              IFGITERALLE.MSTOP1) 30 TO 140
CAVITY SHAPE.
                     VI CETALLOLAD YCABSIA
                     SUBROUTINE CAVITY.
              #RITE(5,237)
    237 FORMAT(2X++---CAVITY SHAPE------)
              VCAV1=VCAV+1
             33 235 4CAV=1+NCAV1+2
    235 WRITE(6+235) CAVX(KCAV )+CAVY(KCAV )
    235 FORMARCIOC+*X=*,E14.7,10X,*f=*,E14.7)
Commence of the Insert A announce of the second of the sec
    140 CONTINUE
              KCCC=0.
              YCCC=3.
              #RITE(5+823)
    00 921 IS4P=1.51
              X=+32*(IS+2-1)
              CALL SHAPE (X+Y+SETA+3)
    821 4RIFE(5.822) K.Y
    922 FORMAT(5x++x=++F10+5+2x++Y=++F10+5)
              wRITE(7,768) SXSI(1),SXSI(2),SXSI(3),SXSI(4),SXSI(5),SXSI(6)
    759 FORMAT(5E13.6)
             33 765 IC=1.LPM
    756 #RITE(7+757) SARC(IC)+BETAN(IC)
757 FORMAF(2E14+7)
             00 1766 IC=1.LPMM1
  1755 drite(7.757) SARC2(10).3ETAV2(10)
             IF(ITERA-SE-MSTOP) 30 TO 999
              -341=-P4-1
              SPACE=CSPACE
              HSPACE=HCSPAC
             33 50 IM=1.-P41
              IF (IM.EQ.1) GO TO E1
              IF(IM.E2._PM1) 30 TO 55
              IF(IM.EQ._2(1) 30 TO 37
              IF(IM.E2._P() GO TO 93
             1 = (14.GT.LPK) GD TD 93
              XY=-1.+SPACE+FLDAT(I4-1)++SPACE
```

```
<2(1)=-1.+SPACE+F_34F(14-2)
   XZ(2)=XZ(1)+SPACE
   XZ(3)=XZ(2)+SPACE
   XZ(4)=XZ(3)+SPACE
    30 to 99
 33 SPACE=FSPACE
    HSPACE=hFSPAC
    KY=KBET+HSPACE+ SPASE+FLDAT(I4-LPK)
    XZ(1)=XBET+SPACE+FLJAT(IM-LPK-1)
   XZ(2)=XZ(1)+SPACE
   XZ(3)=XZ(2)+SPACE
   XZ(4)=XZ(3)+$PACE
 99 00 55 IX=1.4
 56 YBE(IK)=BETAN(IM+IK-2)
    BETAMEIM) = AITKENEXZ. YBE. XY. 3)
    50 TO 151
 97 3ETAM(LPK1)=G+5+(3ETAN(LPK1)+3ETAN(LPK))
   G0 T0 151
 98 BETAM(_PK)=0.5+(BETAN(_P()+3ETAN(_P(+1))
   50 TO 151
 51 BETAM(1)=0.5*(BETAN(1)+BETAN(2))
    GO TO 151
 55 BETAMCLPM1) = 0.5 = (BETAVELPM1) + BETANCLPM))
151 CONTINUE
50 CONTINUE
   IF(ITERA-E3-1) 30 T3 6
   33 41 IE=1+_P4
 41 BETANCIED=BETANCIED+C1.-XXMD+BETANOCIED+XXM
   00 42 IFG=1,L341
 42 BETAM(IFG)=BETAM(IFG)+(1.-XYM)+BETA40(IFG)+XXM
   33 425 IF3=1+LP441
6 ITERA=ITERA+1
   IF (ITERA-ST-MSTOP) 50 TO 28
   SC TO 160
28 #RITE(5+29)
29 FORMAT(5X+26HITER4TION WAS TERMAINATED+)
339 CONTINUE
   3102
   END
```

v .

```
SUBROUTINE DXFNE (X,STOL,M,I,DS,DF,FFF4)
     DIMENSION =(6)+=(50+5)+x(5)+2(6+6)+431(6)+XM41(6)
      CE+E)TIECTAD/DELT(5+5)
      COMMON/FREEDAY/XFREED, YFREED
      COMMON YCCC+SBETA2
      COMMON XITH(206) +XITN(200) +ANSG2S(200) +SARC2(200)
      COMMON CAVECTOD, CATECOD, SETABLE FACE COCHNOAT, LPMM. NS2
      COMMON FLAPAN.DELTA.JGAP.ALFAI.GAMMA
     COMMON SIGMA-SBETA-XX4-ICPI-SARCOD(513)
      COMMON IDJ. . XA . XB . XC . TANG . E ? . YC . YR . JBIGS . XLBIGS . BIGS . SMALS . DSS
      COMMON X$V(6),CCC1.CLE.ERC.(YY,XM.IFERA.XX)CCC),CCC(E),XX(6)
      COMMON PSIZ+LF+SARC(513)+SARCO(513)+LPM+DE
      COMMON BETAN (513) + BETAM (513) + IU+LPK + XII (200) + XUU (200) + XUX
      COMMON XROUND.4244.3239.C2CC
     COMPON AAAA, 8855,0000, A8,88,08,08,73AUS(100), 43AUS(100), NGAUS
     PAI=3-141592653
     I = 6
     IF(ITERA . . E . 3) 50 TO 272
     D0 67 IIJ=1.6
  57 HRITE(5,65) IIJ+X(IIJ)
   56 FORMAT(1x+24x(+I1+24)=+E14+7)
  272 CONTINUE
  35 SI1=2.+DE
     SI 5=2. DG
     I=(x(1).L[.5]1) x(1)=311
     SI13=x(1)+2.+0G
     I=(x(2).LT.SI10) x(2)=SI10
     SI11=x(2)+2.+3G
     I=(x(3).LT.SI11) x(3)=SI11
     I=(Y(4).LT.SIE) X(4)=SIE
     SI5=(0.5+PAI-GAMMA)+(1.-0.02)
     IF (4 (5) .LT.G.) 32 T3 75
     IF(x(5).GT.SIE) x(5) #SI5
     33 T3 79
  78 I=(ABS(x(5)).GT.SI5) x(5)=-SI5
  79 CONTINUE
     IF (X(5) = LE = 0 = ) WRITE(5 = 1122)
     33 56 LIJ=1+6
  53 4RIFE(5.65) IIJ.x(IIJ)
     IJ=1
00 20 IK=1.6
  20 YXS(IK)=X(IK)
   SUPETRICS &
     COTRL = 1
CALL FIINTL(YINTI+COTRL)
     SUBROUTINE FIINTL CALCULATES THE INTEGRALS IN F(1).
      KOTRL = 2
      CALL FIINTL (YINT2+KSTRL)
      KCTRL = 3
      SALL FIINT_ (YINTS+KSTRL)
      KOTRL = 4
      CALL FIINTL (YINT4+COTRL)
     CS1=ALOG(COS(YXS(5)+3AMMA)/COS(ALFA1+GAMMA)+YXS(6))
                           ))AMMAG+1AFLA(SOC/)AMMAG+)5(SXY(SOC(GOLA = 1SC
     FA = -(YINT1/PAI+YINT2-(CCC1+CS1/PAI)+YINT3
    1+YINT4/PAI-YXS(5))
                        ATVIYOSTVIYOZTVIYOTTVIY ) G7-5( EFIRA )1-3E-JI( FI
```

```
)) x2+7+1=(4++---=R4 )1(F F0 41+31+21+11---++xc16 TA4RQF 07
      I^{\pm} (I) \cdot E3 \cdot I) = (1) = \pm 4
      I# (IJ.EG.2) 30 TO 3
      L= (1J.E0.3) 80 TO >
      IF (IJ.EG.4) 30 TO 320
      IF (IJ.E2.5) GO TO 321
IF (IJ.E2.5) GO TO 522
      1=(IJ.53.55) GD TD 5222

P(1,6)=-YIVT3/(PAI+Y(3(6))
      P(1+3) = TAN(YXS(5)+GAMMA)+YINT3/PAI+1+
      LJ = 2
      YXS(1) = X(1)+DELT(1+1)
    30 TO 5
      1) = 3
      f(S(1) = ((1)+0ELF(1+1)
    30 TC 5
      P(1+1) = (F1P-F1Q)/(2.*OELT(1+1))
      IJ = 4
      YXS(1) = X(1)
      YXS(2) = X(2) + DELT(1+2)
      30 TG 5
  320 F1P = -FA
      YXS(2) = X(2) - DELT(1+2)
      1J = 5
      33 TO 5
  321 FIG = -FA
      P(1,2) = (F1P-F1Q)/(2.*DELT(1,2))
f(S(2) = ((2)
      YXS(3) = X(3) + DELT(1+3)
      LJ = 5
      30 TO 5
  322 F1 = -FA
      IJ=55
      YXS(3)=X(3)-DELT(1+3)
      33 10 5
 3222 F1G==FA
      P(1+3) = (F1P-F1Q)/(2+*DELT(1+3))
      2(1.4) = C.
----- (2) AND F(3)-
      33 30 IM=1+5
   SC YXS(IM)=X(IM)
      IJ = 7
  336 CONTINUE
      XKKX=4_DG(DDS(A_FA1+3AMMA)/DDS(YXS(5)+GAMMA)/YXS(6))
                            ))AMMA3+)5(SYY(SOC/)AMMA3+1AFLA(SOC(GOLA = XKKX
      XX1 = YXS(4)+SIN(DE_TA)
YY1 = YXS(4)+COS(CE_TA)
      YY12=YY1 ** 2
      CON1 = CCC1-X<<X/PAI
      XRR = 0.
X44 = 0.
      DO 331 MIG = 1.4
      CALL RMINE(SOLNR+SOLNM+MIG)
      XRRI(413) = SOLNR
      X441 (416) = SOLN4
      IAGNEDINTERX = MMMX
      I= (MI2.E3.1) XRRR = CON1*XRRI(MI3)
```

```
IF (MIG.EL.1) XMM4 = CON1-YMMI(MIG)
      (EIP) | FFx (4.23.61F) = |
      I = (MIQ+E2+4) \times MM4 = -4MMI(MI2)
                                   )4-1=I-)I(IRRX( )17-5( ETIR. )7-GE-JI( FI
                                   )4-1=I-)[(IMMX( )27-5( ETIRE )7-2E-JI( FI
        )) X2.7.41E(4.**--ERA ) 3(F DVA )2(F FO 4.1=1.) ] (IRRX---.X01(TAMRCF 17
        )) x2.7.415(4.4----: 74 )3(F ) YA )2(F FO 4.1=1.) I (IM4x----...) O1(TA4ROF 27
      xRR = xRR+xRRR
      X44 = X44+X484
  331 CONTINUE
C----CALCULATION OF H1(ZETA1)------
      x3121 = x41+1.
      XSIME = XX1-YXS(1)
      X314F = XX1-YXS(3)
      XSI*C = XX1-YXS(2)
      x31=12 = x51P1++2
      S**EP12) = $3*12x
      xSIMF2 = xSIMF++2
      #314C2 = 4514C++2
      RRA = SGRT(XSIP12+YY12)
      RRB = SGRT(XSIMB2+YY12)
      PRC = SGRT(XSIMF2+YY12)
      RRD = SQRT(XSIMC2+YF12)
      THIA = ATANGYY1/KSIP1)
      IF (XSIP1-LE-0-) THEA = PAI+THEA
      (EPISX\IYY) FAR = EIFT
      EIFT+IAG = EIHT (.0.34.6MIZX)
      THIS = ATANCYY1/XSI4F)
      IF (XSIMFOLEOD) THIS = PAI+THIS
      CHICX/LYY3+ATA = CIHT
      CIFT+IAF = CIFT (.C.31.3MIZX) %I
      RR1 = SGRT(RRA+RR9+RRC/RRD)
      (CIFT-CIFT+61FT+A1FT) *5.
      COTH1 = COS(THIT1)
      SITH1 = SIN(THIT1)
      F2C3 = RR1+(XRR+C3T+1+X44+SIT+1)-4LFA1
      F3C0 = RR1+(xRR+6IT+1+x44+C)T+1)+X<(x
      IF (IJ.EQ.7) F(2) = -F200
      I = (IJ \cdot EQ \cdot 7) = (3) = -7300
      I# (IJ.E3.8) 30 TO 548
      IF (IJ.EG.9) SO TO 341
      IF (IJ.E2.10) GO TO 342
      IF (IJ.EG.11) SO TO 343
      IF (IJ.EG.12) 30 TO 344
      I# (IJ.EW.13) GD TD 345
      I= (IJ.EG.14) 30 TO 346
I= (IJ.E2.15) GD TO 347
      TA2G = TAN(YXS(5)+SAMMA)
XSXC = XRRI(1)+SITH1+XMMI(1)+COTH1
      xcxs = xrri(1) +cot+1-x441(1) +sith1
      P(2.5) = -RR1+TA23+KCXS
      2(2.5) = 2(2.5)/2AI
      R(3,5) = -RR1+TA25+XSXC
      ?(3,5) = ?(3,5)/?4I+T429
      P(2.5) = RR1+XCXS/(PAI+YXS(5))
      P(3+6) = RR1+XSXC/(PAI+YXS(5))-1./Y(S(6)
      11 = 3
      \forall xS(1) = x(1) + DELT(1+2)
      30 TQ 330
  340 FP2 = F2C)
```

```
F93 = F3C)
      IJ = 9
      YXS(1) = X(1)-DELT(2+1)
      30 TO 330
  3+1 P(2+1) = (FP2-F2C3)/(2.*DE_T(2+1))
      2(3+1) = (#23-F3C3)/(2+25_f(2+1))
      YXS(1) = X(1)
      \forall x S(2) = x(2) + \exists LT(2+2)
       IJ = 10
  33 TO 330
342 FP2 = F2C3
      FP3 = F3C3
      14S(2) = ((2)-05-1(2+2)
      LJ=11
      30 TO 330
  3+3 P(2+2) = (FP2-F2C0)/(2++DELT(2+2))
       ?(3+2) = (??3-f300)/(2++0E_f(2+2))
      4xS(2) = x(2)
      \forall x S(3) = x(3) + 0 = x(2+3)
      IJ = 12
30 TO 338
  344 FP2 = F2C3
      FP3 = F300
      4x5(3) = x(3) - CELT(2.3)
      13 = 13
      30 10 330
  3+5 P(2+3) = (FP2-F200)/(2+0Euf(2+3))
      P(3.3) = (FP3-F3C0)/(2.*05LT(2.3))
      YXS(4) = ((4)+3E_T(2+4)
      (E) X = (E) 2 X Y
      LJ=14
       90 TO 330
  3+6 FP2=F200
      F23=F300
      YYS(4) = Y(4) - DELT(2+4)
      LJ = 15
      50 TU 330
  347 P(2+4) = (FP2+F2C3)/(2++0E_T(2+4))
P(3+4) = (FP3-F3C3)/(2++0E_T(2+4))
      YXS(4)=X(4)
IJ=16
       Y#5(1)=X(1)+DE_T(4+1)
  199 CALL OFSIME(ANS2)
      17.1Je20e13) 30 TO 575
17(IJe20e13) 30 TO 515
17(IJe20e17) GO TO 514
17(IJe20e17) GO TO 514
      IF(IJ.EQ.20) GC TO 515
      1=(IJ+22+21) 30 TO 517
       I=(IJ.EG.22) 30 TO 518
      I= (13.54.23) SC TO 521
      IF(IJ.EG.24) GO TO 522
      1=(IJ.EG.25) BC TO 523
      1*(1J.E4.25) G2 T3 524
      IF (IJ.EQ.261) GO TO 625
IF (IJ.EQ.262) GO TO 625
  SIS ANSPEANSE
      IJ=17
      YXS(1)=X(1)-DELT(4+1)
```

```
30 TO 159
SI4 AVSZ=AVSZ
     LJ=18
     2(4+1)=-(ANSP-ANS2)/(2.+0E_T(4+1))
     YXS(1)=X(1)
     30 10 199
SIS ANSFEANSE
     F(4)=-(BISS-ANSF)
     IJ=19
     YXS(2)=X(2)+DELT(4+2)+ASS(X(2))
30 TO 199
515 ANSPREANSS
    11=20
     YXS(2)=X(2)+JELT(4+2)+A85(x(2))
     33 TO 199
515 AVS32=AVS2
    P(4+2)=-(ANSPP-ANSQ2)/(2.+DILT(4+2)+ABS(X(2)))
    YX5(2)=X(2)
    IJ=21
    YXS(3)=X(3)+DE_T(4+3)+X(3)
    33 13 199
517 ANSIPEANSE
    13=22
    YXS(3)=X(3)-DELT(4+3)+X(3)
    30 70 199
513 AVS12=AVS2
    P(4+3)=-(44S1P-ANS11)/(2+DELT(4+3)+X(3))
    745(3)=x(3)
    13=23
    YXS(4) #X(4) + DELT(4+4) + ASS(X(4))
    30 TO 199
521 AVA=AVS2
    IJ=24
    YXS(4)=X(4)-DELT(4+1)-A3S(X(4))
    33 TO 199
SEE ANBHANSE
    ?(4,4)=-(AV4-ANE)/(2,*)E_T(4,4)*ABS(X(4)))
    YXS(4)=X(4)
    LJ=25
    YXS(5)=X(5)+DELT(4+5)
    30 fo 199
523 344=4452
    IJ=26
    7x5(5)=X(5)+3ELT(4+5)
    30 TO 199
524 3N5=ANS2
    =(4+5)=-(3+4-8N3)/(2.+0ELT(4+5))
    YXS(5)=X(5)
    FFF4==(4)
    YXS(5) = X(5)
    IJ = 251
    YXS(6) = X(5) + DELT(4.6)
    30 TO 199
525 BNA = AVS2
    TX5(5) = x(5) - DELT(4.5)
    13=262
    50 TO 199
527 = 68 656
    P(4+6) = -(3NA-3N3)/(2.*DELT(4+3))
Y#S(6) = ((5)
```

```
C F(5) AND F(6)
   FIRST CALCULATE THE PHYSICAL COORDINATES
 .YTIWED TO TRICE ONE BET FOR
SITHIS SUBROUTINE FINDS THE END POINT OF SAVITY.
       IJ = 27
  BIS CALL CAVITY (XCEND+YCEND)

| FHEN FIND S2+ THE ARC LENGTH OF THE SECOND WETTED PORTION.
| CALL SUBROUTINE ARCS2 FOR THIS PURPOSE.
| CALL SUBROUTINE ARCS2 FOR THIS PURPOSE.
| CALL SUBROUTINE ARCS2 FOR THIS PURPOSE.
       IF (IJ.E2.27) XFREED=KDEND
                                            )6-1=I-)I(SXY(-DNECX-JI )035-6(ETIRW
                                            ))5.21E.x2(6.x5.5.21E.x5.3I.x1(TAMRC= 035
       CALL ARCS2 (S2+XCEND+YCEND)
3 F(6)=YCEVD=FUNCTION(XCEVD)=0 TO BE SATISFIED.
       IS1I2=3
       CALL SHAPE(XCEND+YUPPER+BETA+IS1I2)
       4817E(6.533) xCEV3.32.4JPPER
  533 FORMAT(EX.**CEND=*.512.5.5X.**S2=*.612.5.5X.**YJPPER=*.612.5)
  IF(IU-20-27) BISS2-82
FINALLY GO IVID F(5) COMPUTATIONS.
CALL DESIGNATIONS)
       I=(IJ.EQ.27) GO TO 323
I=(IJ.EQ.28) GO TO 321
       1F (IJ.EG.29) SO TO 322
       IF (IJ-EG-30) SO TO 923
       1F (IJ.EQ.31) 60 TO 324
       IF (IJ.EQ.32) GO TO 325
       17 (IJ.E4.33) GO FO 325
       I= (IJ.EQ.34) GO TO 327
I=(IJ.EQ.341) GO TO 330
       IF (IJ.E2.35) GO TO 323
       IF (IJ.EG.35) GD TO 329
       IF (IJ.EQ.37) GO TO 832
       IF (IJ.EG.33) GO TO 333
  920 F(5) = -($2-ANS5)
       F(6) = -(YCEND-YJPPER)
       IJ = 29
       *xS(1) = x(1)+DELT(5,1)
       30 TO 815
  321 ANP = ANS5-52
       ANFO = YCEND - YUPPER
       IJ = 29
       YX5(1) = X(1)-DELT(5+1)
       33 TO 315
  322 P(5+1) = +(44P-(4485-52))/(2++01LT(5+1))
       ANGS = YCEND-YUPPER
       P(5+1) = (44P5 + A436)/(2++3E_T(5+1))
       YXS(1) = X(1)
       yxS(2) = x(2)+DE_T(5+2)+A3S(x(2))
       1) = 30
       30 TO 815
  323 ANP = ANS5-S2
       ANP6 = YCEND-YUPPER
       YXS(2) = X(2) - DELF(5,2) + ABS(X(2))
       IJ = 31
       33 TO 815
  324 P(5+2) = -(ANP-(ANS5-S2))/(2+DILT(5+2)+ABS(X(2)))
       ANGS = YCEND-YUPPER
       P(5+2) = (44P5 - 4435)/(2++3E_T(5+2)+ABS(X(2)))
       YXS(2) = x(2)
```

```
LJ = 32
    YXS(3) = X(3)+DELT(5+3)+X(3)
    30 TO 815
325 AVP = ANS5-S2
    ANPS = YCEND - YUPPER
    145(3) = 4(3)-DELT(5+3)+X(3)
    1J = 33
50 TQ 815
326 P(5.3) = -(ANP-(ANS5-S2))/(2.+DELT(5.3)+X(3))
    P(5+3) = (E+3) + YJPPER
P(5+3) = (ANP6 + AN35)/(2++3E_T(5+3)+X(3))
    IJ = 34
    YXS(4) = X(4) + DELT(5+4) + ABS(X(4))
    33 TO 815
927 ANP = ANSE-S2
    ANPE - YCEND - YUPPER
    YXS(4) = ((4) - DELT(5+4) + ABS(X(4))
     LJ=341
    30 [0 315
SURITACO DEB
    P(5+4) = -(ANP-(ANS5-S2))/(2.*DELT(5+4)*ABS(X(4)))
    ANGE = YCEND - YUPPER
    P(6+4) = (AVP5 - AV35)/(2++3E_T(5+4)+ABS(x(4)))
    YXS(4) = ((4)
    YXS(3) = X(3) + GELT(5,5)
    IJ = 35
    30 TO 815
329 AVP = ANS5-$2
    ANPS = YCEND-YUPPER
    YXS(5) = Y(5)-DE_T(5+3)
    IJ =35
    50 TC 815
529 P(5.5) = -(ANP-(ANS5-S2))/(2.*DELT(5.5))
    ANG6 = YCEND - YUPPER
    P(5+5) = (ANPS - ANGS)/(2++)E_T(5+5))
    YXS(5)=X(5)
    YX5(6)=X(6) + DELT(5+6)
    IJ= 37
30 TO 615
532 AVP = AVS5 = S2
    ANPS = YCEND - YUPPER
    YXS(6) = X(6) - DELF(5+6)
    IJ= 38
    30 10 815
153 P(5+6) = -(4N2 -(4N35 - 52))/(2.+35.T(5+6))
    AVGS = YCEND - YUPPER
    *(5+6) = (44P6 - 4426)/(2.+)E_T(5+6))
    YXS(6) = Y(5)
DD 565 IK=1+6

556 WRITE(5+657) (P(IK+J)+J=1+5)

557 FDRMAF(3y+**(I+J)=++5(E14+7+2X))

4RIFE(5+251) BISS2+(CDC+YCCC

251 FORMAT(20X+*BIGS2=++F10+5+2X+*XCCC=++F10+5+2X+*YCCC=++F10+E1
    NCAVIENCAV+1
    33 253 ICV=1.NCAV1.2
CASS MRITE(6.252) CAVECICAL CESTIFICATION
252 FORMAT(10x++C4 vx=++=10+5+5x++C4 Vx++F10+5)
    33 129 ITx=1.5
129 #RITE(5+131) IT#+*([f()
```

```
131 FOPMAT(1x+2mF(+I1+2m)=+E14+7)
    33 132 IU3=1+5
    IF(ITERA .LE . 3) 30 TO 385
    00 132 IU3=1+6
132 WRITE(6+133) IUP+1U3+P(IUP+IUQ)
133 FORMARCIX+24PC+11+14+11+24)=+E14+7)
335 CONFINIE
    CALL DETERM(P.6.DETED)
    00 25 10ET=1.5
00 26 LPG=1.6
    2(LPG.IDET) =P(LPG.TTET)
 26 P(LPG.IDET)=F(LPG)
    CALL DETERMIPAGETER
    IFKIDET.ER.1) DELB=DEFE/DET30
    IF(IDET.EQ.2) DELC=DETE/DETBO
    IF(IDET-6203) DELD=DETE/DET30
IF(IDET-6204) DELE=DETE/DET30
IF(IDET-6205) DELF=DETE/DET30
    IF (IDET.EG.6) DELG=DETE/DETBO
    33 27 _23=1.6
 27 3(125,1057)=2(125,1057)
 25 CONTINUE
    X(1)=X(1)+)EL3
    X(2)=X(2)+3ELC
    x(3)=x(3)+DELQ
    X(4)=X(4)+DELE
    *(5)=X(5)+)ELF
    x(5) = x(5) + 0EL3
    00 60 LMN=1.6
 SO WRITE(5.61) LAN.X(LAN)
 51 FORMAT(1x+24x(+11+24)=+214+7)
    4353=43S(JE_B/X(1))
    ABSC=ABS(DELC/X(2))
    4350=435(DE_D/X(3))
    435E=435(DE_E/X(4))
    ABSF=ABS(DELF/X(5))
    43S3 = 48S(3ELS/x(6))
    KEIO=e
    IF(ABSB-LT.STDL) (EID=1
    IF(ABSC.GT.STOL) KEID=8
    IF (ABSD.GT.STOL) KEID=0
    IF(ABSE+ST+STOL) KELD=0
    IF(ABSF.GT.STOL) KEID=G
    IF (ABSG.GT.STOL) KEID=0
    IF(KEI0+E3+1) GO TO 35
    I=I+1
    WRITE(5+42) 1
 42 FORMAT(20x+14HITERATION NO.=+12)
    IF(I-E2-4) 30 TO 35
    G0 T0 55
 35 IF(I.E2.M) 30 TO 36
    60 TO 39
 36 MRITE(6.37)
 57 FORMAT(1X+34HOYFNEW DID NOT CONVERGE WITHIN 141)
    I=(x(1)+LT+SI1+ x(1)=SI1
    5110=4(1)+2.+35
    I=(X(2).LT.SI10) X(2)=SI10
    SI11=¥(2)+2.+35
    I=(x(3).LT.SI11) x(3)=SI11
    I = (x(4) - T - SIS) x(4) = SIS
```

* *

```
SUBROUTINE OFSIMICANS+NOF+XCA)
    DIMENSION XST(6)
COMMON YCCC+SBETA2
    C34404 XIT4(200)+XIT4(200)+A45325(23C)+SARC2(203)
    COMMON CAVX(100) .CAVY(100) .BETAB.BETAC.XCCC.NCA/.LPMM.NS2
    (ODI)SYATER (OCI)SYATER (OCI)MATER YEHOM . FRANCICO) COPPCA VCPCC
    COMMON SISMA, BBETA, XX4, ICPI, SARCO) (513)
    COMMON XSV(6) +CCC1 + CLE+ERC+YMY+XM+ITERA+SXSIO(6) +SXSICC(6) +YXS(6) COMMON PSIZ+LP+SARC(513)+SARCD(513)+CPM+DE
    COMMON BETAN(513) + BETAM(513) + IJ+LPK, KII(200) + KJJ(200) + XJX
    C3440V XR35V0+A2A4+3233+C2C3
    CUMPON ARABASES COCCASES SECTOS CONTRACTOR (COC) SEEE ARABA VORPOO
           # C CALLED FROM FINT.

# 1 CALLED FROM RMINT FOR REAL PART.

# 2 CALLED FROM RMINT FOR IMAG. PART.

# 3 CALLED FROM CAVITY OXFNEL AT F(E)
    ∀3≈
    43¢
    NOF
    a C V
    IF (IDPI-EQ.0) SG TD 9
    30 10 IG = 1,5
 10 KST(I2) = KSN(I2)
    53 TO 12
  9 00 11 IH = 1.5
 II XST(IH) = YXS(IH)
 12 CONTINUE
    IF(ITERA-E2-1) 30 TO 222
    33 TC 223
222 00 224 IL( = 1+-24
224 BETANCILK) = SEETA
223 CONTINUE
    CSPACE = (1.+xST(1))/FLOAT(LPK)
FSPACE = CSPACE/FLOAT(LPH-2K)
     ->45=_24-3
    XSET = -1.+CSPACE+FLDAT(LPK-1)
    X311=-1.+C57ACE
    3E1 = 3ETAN(2)
    A=1 = (xSI1-xST(2))/((xSI1+1+)+(xST(1)-xSI1)+(xSI1-xST(3)))
    APIS = SGRT(API)
    =3 = 3E1+A-1S
    XX1 = XST(4)+SIN(JE_T4)
    YY1 = XST(4)+COS(JE_TA)
    YY12 = YY1**2
    PLM = XSI1 -XX1
    7.42 = 7L4++2
    PLMA = PLM2+YY12
    PXSR = PLM/PLMA
    PXSI = YY1/PLMA
     I=(NO=.EQ.1) =3 = F3+2XSR
    I=(v0=.E4.2) =3 = =5+2KSI
     I=(NOF.EG.3) F3=F3/(XSI1-XCA)
     4 4 S 4 = 7 .
    00 1 I = 2+_P43+2
F1 = F3
     SPACE = CSPACE
     I= (I.3E.LP4) SO TO 30
     #SI2 = -1.+3PACE+=LJAT(I)
     XSI3 = XSI2+SPACE
 30 TO 31
30 SPACE = FSPACE
     XSI2 = XBET+SPACE+F_JAT(I-_PK+1)
```

```
XSI3 = XSI2+SPACE
51 BE2 = BETAN(I+1)
   BES = BETAV(I+2)
   AP2 = (xSI2-xST(2))/((xSI2+1.)+(xST(1)-xSI2)+(xSI2-xST(3)))
   A^{3} = (xSI3-xST(2))/((xSI3+1+)+(xST(1)+xSI3)+(xSI3-xST(3)))
   AP2S = SQRT(AP2)
AP3S = SQRT(AP3)
   F2 = 3£2+4°2S
   F3 = 3£3+4°3S
   HA2 = KSIZ-XX1
   HA22 = HA2++2
   43 = 4A22+YY12
   HCR2 = HA2/48
HCI2 = YY1/46
   HA3 = XSI3-XX1
   HA32 = 4A3++2
   1)=4A32+YY12
   HCR3 = HA3/HD
   H013 = YY1/HD
   IF(NOF.EQ.1) F2 = F2.40R2
IF(NOF.EQ.1) F3 = F3.40R3
   I=(NOF+EG+2) F3 = F3+H0I3
I= (NOF+EG+3) F2 = F2/(XSI2+KC4)
   If (NOF.EG.3) F3 = \frac{2}{3} (XSI3-XCA)
   FSJ4 = (F1+4. +F2+F3) +SPACE/3.
   ANSA = ANSA+FSUM
1 CONTINUE
   $21 = $2RT((-1.-x$T(2))/(-1.-x$T(3)))
   $32 = $GRT(X$T(1)+1.>
   533 = 53RT((xST(1) - xST(2))/(xST(1) - (ST(3)))
   ANT1 = EETAN(1)+2.+SGRT(CSPACE)+SG1/SG2
   ANT2 = BETAN(LPM)+2.+SGRT(#SPACE)+SG3/SG2
   APLA = -1.-XX1
APLA2 = APLA+2
   4265 = XST(1)-XX1
   APL32 = APL3 ** 2
   If(VOF.E3.1) ANT1 = ANT1+47_4/(47.42+YY12)
   IF (NOF.EG.1) ANT2 = ANT2+APL8/(APL82+YY12)
   I= (NJ=.E2.2 ) ANT1 = ANT1+YY1/(A2.A2+YY12)
   1= (NDF.E3.2) ANT2 = ANT2+YY1/(APLB2+YY12)
   IF (NOF.EQ.3) ANT = ANTI/(-1.-XCA)
IF (NOF.EQ.3) ANT = ANTZ/(KST(1)-KCA)
   ANS = ANSA+ANT1+ANT2
   RETURN
   END
```

.,

```
SUBROUTINE OFSIM2(A452)
      DIMENSION X(3)+XIT(3)+YY(3)+XITC(3)+EXU(3)+FCN3(3)+XST(6)
      SATBER-CODY NOPPEC
      COMMON XITM(200) +XITN(200) +ANSG2S(200) +SARC2(200)
      COMMON CAVXCINOS .CAVYCIOOS .SETAB.SETAC.XCCC.NCAV.PMM.NS2
      COMMON AUC130) + ISHARP + VCHEY + BETANC130) + BETAN2(100) + SETAN2(100)
      COMMON FLAPAN-DELTA-DSAP-ALFA1-SAMMA
      CELECCOPPS 41 COLORNA PER 4 PER 4 PER 5 POPPEC
      COMMON IDJL.XA.XB.XC.TANG.EP.YC.YR.JBIGS.XLBIGS.BIGS.SMALS.CSS
      C3M43N XSN(5)#CCC1+JLE+ERJ+YYY+X4+IFERA+SXSIO(6)+SXSIO0(6)+YXS(6)
      COMMON PSIZ.LP.SARC(513),SARC2(513).LP4.DE
      CDMMON BETAN(513)+BETAM(513)+IJ+LP<+XII(200)+KJJ(200)+XXX
      33 13 IS=1.5
   13 XST(16)=YXS(16)
      PAI=3-141592653
      JJ2=C3S(A_FA1+GAMMA)/C3S(XST(5)+GAMMA)/XST(5)
                                    JAMMAS+) 5(TSX(SDC/) AMMAS+1 AFLA(SOC=2UJ
      XKKK=ALDG(JJ2)
      CSPACE=(1.+ XST(1))/FLDAT(_PK)
      HCSPAC=G.5+CSPACE
      FSPACE=CSPACE/FLDAT(LPM-LPK)
      4-3-40-0.5+-S-40E
      XBET=-1.+CSPACE+F_DAT(_PK-1)
      COE=COS (DELTA)
      SDE=SIN(DE_FA)
      SA=XST(1)-XST(4)+SDE
      33=XST(4) + 23E
      PPF=CJE/(3A++2+GB++2)
      FOVE(3) = DSAP +PPP+XSf(1)/(PAI+SGRT(1++SIGMA))
      とうくてニレラサーしきく+1
      33 1 IP=1.LPM
      I=([2.83.1) GO TO 2
      HSP4CE=hFSPAC
      SPACE=FSPACE
      IF(IP.GT.LPKI) 30 TO 38
      X(1)=XST(1)-SPACE+=_DAT(12-2)
      X(2)=X(1)-+SPACE
      x(3)=x(1)-SPACE
      33 [3 31
   SO HSPACE=HCSPAC
      SPACE=CSP4CE
      F(1)=X3ET-SPACE+FLOAT(IP-LPKI-1)
      x(2)=x(1)-45P4CE
      X(3)=X(1)-SPACE
   51 =CN3(1)=FCN3(3)
      V<=3
      IF(IP-E2-L-M) NK=2
      ) 5 I=2,VK
      1F(1J.GE.23) 60 TO 3
   33 T3 T

3 IF(1.620.2) XIT(2)=XIT4(LP4-IP+1)

IF(1.620.3) XIT(3)=XIT4(LP4-IP+1)
      33 13 5
    7 CONTINUE
      (1) X=(1) YY
C DESIMS CALCULATE G1 .
      CALL OFSIMBERYCID-XITCCID+12+1)
      XIT(I)=XITC(I)
```

```
IF(IJ.E2.13) GO TO 5 30 TO 5
     6 IF([.E3.2) XITM(LPM-IP+1)=XIT(I)
IF([.E3.3) XITM(LPM-IP+1)=XIT(I)
     5 CONTINUE
       ((I) * I X - ) * X = ( I ) L X 3
       GC=X(I)-XST(4)+SDE
       30=x$[(4)*00E
       PKA=52++2+30++2
       DHDX=DGAP+X(I)+CDE/(PXA+PAI)
       FCN3(I)=ExJ(I)+3H3X/JJ2
       LF(x(I).LE.C.) =CN3(I)===CN3(I)
B CONTINUE
C CHECK IF FONSKID IS ALMAYS POSITIVE.
IFKIP.EQ._PMD GO TO 20
       30 FC 21
    20 PPG=CDE/((-1.-xST(4)+SDE)++2+(xST(4)+CDE)++2)/UJ2
       FF3=D349+993/94I
       FC43(3)=FF3
    21 SJ4=(FCN3(1)+FCN3(2)+4.+FCN3(3))+45PACE/3.
       AVSZ=AVSZ+SUM
       I=(IJ+EG+13) SARC(L=4-IP+1)=A452
     30 TO 1
2 SARCE==M)=0.
     AVS2=3.
1 CONTINUE
C KITHELPHYEST AT POINT B.
T KINT(1)=G1 AT POINT Y=1.

Z XINT(1)=G1 AT POINT Y=1.
       #1Tv(1)=G.
       RETURY
       END
```

```
SJEROJILVE OFSIMS(Y+(KII+L*+L)
              DIMENSION xST(6) +FX_S(100) +FA(200)
               COMMUN YCCC+SBETA2
              COMPLY XITM(200) +XITY(200) +ANSG2S(250) +SARC2(200)
              COMPLE CAVECTOD + CAVECTOD + SETAB+SEFAC+ECOCHNOAV+_FMM+ NS2
               COM LU AJ(130) . ISHARP. VCHB(.99TAV(130) .886FAV2(100) .9ETAV2(100)
               COMION FLAPANIDELTAIDSAPIALFALISAMMA
               CDM454 SL344+SBETA+<(4+ICPI+S4RC55(513)
               COMMON IDJL.XA.X8.XC.TANG.EP.YC.YR.JBIGS.XLBIGS.BIGS.SMALS.DSS
               CALACE SXICALEXECTION OF THE PROPERTY OF THE P
              COMMON PSIZ.LP.SARC(313).SARCD(313).LPM.DE
              COSO+EESE+AASA+CUCAX NOPPCC
               COMMON AAA4+9955+CCCC+85+39+C6+35+T3AUS(103)+#3AUS(100)+NGAUS
              FOUR INTEGRALS TO BE EVALUATED SEFOR XI IS DBTAINED.

NOTE THAT PRIVIDING YUNC YUNCHARDETRI THAT BTOM

SAU UARDETRI SCASSAD AND CASCADE.
              SEE THE NOTE OF TO 3951 FOR FOUR INTEGRALS. OUT OF AHICH TAO ARE OF SINGULAR TYPE.
              IF(ICPI.EG.3) GO TO 9
              33 11 ISI=1.6
       11 (ST(ISI)=KSN(ISI)
              33 TO 12
         9 33 13 JTJ=1,6
       13 XST(JTJ)=YXS(JTJ)
      12 941=3-141592653
1= (ITERA+EQ+1) GO TO 60
             30 70 51
      SO CONTINUE
              33 52 IZU = 1.LPM
              BETANCIZU) = SBETA
              BETAM(IZU) = SEETA
      SE CONTINUE
SUVITACO 12
              CSPACE=(1.+ XST(1))/=LDAT(_PK)
               HCSPAC=0.5+CSPACE
              FSPACE=CSPACE/FLDAT(_PM-LPK)
              # 5 P AC = 0 . 5 * F S P A C E
              XBET==1.+CSPACE+FLDAT(_P(-1)
              432=S2RT((ST(1)+1.)
              A93=SGRT((1.+Y)+(XST(1)-Y))
              A36 = S3R\Gamma((XST(3)-Y)/(XST(2)-Y))
              AB3 = AB3+AB6
              IJ2=_>4-I>+1
              IJ3=1
              I=(I-E3-3) IU3=_P4-[-+1
              I=(1.22.0) IU3=12
              BEC=BETAN(IJ3)
              IF([.E3.2) 3EC=8ETA4([J2)
               FAA=BEC/A33
               _241=_24-1
              03 1 14=2.2911
              SPACE=CSPACE
              If(Id.ST._2() GD TD 45
               XSK=-1.+SPACE+FLOAT(IH-1)
              33 T3 46
      45 SPACE=FSPACE
              XSK=XBET+ SPACE+FLOAT(Id-LPK)
       46 If (1.EQ.2) 30 TO 5
```

```
I=(I4.EG.IJ3) GD TD 1
5 #5=502T((1.+x$K)+(x$F(1)-x$())
  #$A1 = $GRT((X$T(3)-X$<)/(X$T(2)-X$<)}
  FS = FS+FS41
   FACIWS=(BETANCIA)/FS-FAA)/(XSC-Y)
1 CONTINUE
  I=(I.E2.2) 30 TO 30
  x = 1 = -1. +HCS = AC
   X = 2 = 4 > 1 + C3 > 4 CE
   X24=XST(1)-4FSFAC
   X23=X74-F57405
   FS1=BETAM(1)/ SQRT((1.+xP1)+(XST(1)-XP1))
   =32=8ETAM(2)/ SQRT((1.+x-2)+(x5T(1)-x-2))
  =S3=BETAM(_>M-2)/ S3TT((10-x34)*(x5T(1)+xP3))
=S4=BETAM(_>M-1)/ S3TT((10-x34)*(x5T(1)-x34))
  F5A1 = S2RF((XST(2)-(21)/(CST(3)-(21))
FSA2 = SQRF((XST(2)-X22)/(XST(3)-X22))
   FSA3 = S2RF((XST(2)-473)/(XSF(3)-473))
   FSA4 = SQRT((xST(2)-x^24)/(xST(3)-r^24))
   FS1 = FS1+FSA1
   *$2 = *$2**$42
   F$3 = F$3+F$A3
   =$4 = =$4+F$A4
   EP1=(FS1=F4A)/(XP1-Y)
   F=2=(#$2-#44)/(Y=2-1)
   FP3=(FS3-FAA)/(xP3-Y)
   =P4=(=$4-=44)/(xP4-1)
   I=(IU3.EG.2) GC TO 21
   I=(IU3.EQ._PM1) GD TO 22
I=(IU3.EQ._PK) GD TO 51
   FA(IU3)=0.5+(FA(IU3-1)+FA(IU3+1))
   53 FO 30
51 BETO=2. +BETAN(LPK) -BETAN(LPK+1)
   ZCARET-TEEXEACK
   ((ACX-(E)72X)/(ACX-(2)72X))7522 = 444=
   EDWEFDAReco!
   =_P<=(FP#-FAA)/(X3A-Y)
   FACIUS) = 0.5 + (FACIUS+1) + FL2<)
   50 TO 30
21 F4(1U3)=(FP1+FP2)/2.
   30 TO 30
22 FA(1U3)=(##3+FP4)/2.
50 KI=3.
   L243=_2M-3
   SPACE=CSPACE
   DO 15 JA=2+LP43+2
   IF(JA.GE._P() SPACE=FSPACE
15 XI=XI+(FAGJA)+4.+F4(JA+1)+F4(JA+2))+SPACE/3.
   IF(I.EQ.2) 30 TO 35
   KI23=0.5+4CSPAC+(FP1+FA(2))+(FA(LP4-1)+FP4) +0.5+4FSPAC
   X<1=41.
   <J=39
   LPMA=LPM+5
   IF(IU3.GE._PMA) XKI=231.
   IF([U3.GE._244) (U=133
   BOZE(BETAM(1)-BETAM(1))/X4I
   33Y=(35TAV(_29)-85T44(_241))/(<I
   HFF=HFSPAC/XKI
   AFHEHESPAC/XKE
```

```
FT3=FP1
    F J 3= F 2 4
    XI4=Da
    X11=0.
    33 292 IT4=1.<U.2
    FT1=FT3
    *J1=FJ3
    (PTI)TACJ++++++FLDAT(IT4)
    X43=X42+H==
    KTZ=-1.+HCSPAC-HFH+FLCAT(ITH)
    XT3=XT2-HFH
    SETA2=SETA4(LPM1)+B)Y+FLOAT(IT4)
    BETA3=BETA2+BCY
    35TT2=35TA4(1)-30Z+7_DAT([T4)
    3ETT3=6ETT2-802
    FS2=8ET42/SQRT((1.+x42)+(xST(1)-x*2))
    FS3=52T43/SGRT((10+(43)+(457(1)+x43))
FV2=62TT2/SGRT((10+xT2)+(x5T(1)+xT2))
    = /3 = 3 = 7 T 3 / S 2 R T ( (1 + ( T 3 ) + ( X S T ( 1 ) - X T 3 ) )
    FS2A = SGRT((xST(2)-x42)/(xST(3)-x42))
    FS34 = S3RTf(XST(2) + x43)/(XST(3) + x43))
    =\sqrt{2}\Delta = SGRT((xST(2)-xT2)/(xST(3)-xT2))
    = \sqrt{34} = SGRT((xST(2) - xT3)/(xST(3) - xT3))
    #52 = #52+#52A
    FS3 = FS3+FS3A
    = 12 = F 12 + F 12 A
    FV3 = FV3+FV3A
    = J2=(=$2-=4A)/(x42-Y)
    FJ3=(F$3-FAA)/(X43-Y)
    =12=(=V2-=AA)/(X12-Y)
    FT3=(FV3-F44)/(XT3-1)
    XI4=XI4+H==+(FU1+FJ2+4++FJ3)/3.
2)2 XI1=XI1+HF4+(FT1+FT2+4++FT3)/3.
    XA4=BETAN(LPM)+2.+SGRT(HFF)/(AB2+(XST(1)-Y))
    X444 = $27((X$T(2)-X$T(1))/(X$T(3)-X$T(1)))
    XA4 = XA4*XA4A
    *[4=X[4+X44
    KA1=SETAN(1) +2. +S3RT(4F4)/(4B2+(-1.-Y))
    xA1A = SQRT((xST(2)+1.)/(xST(3)+1.))
    KA1 = KA1+KA1A
    xI1=xI1+x41
    xI=(XI+XI23+XI1+XI4)+433/24I
    XI=XI+3EC+A_03((XST(1)-Y-4FF)/(1.+Y-4F4))/PAI
    xxI1=-xI
    30 TO 36
 35 XR1=-1.+0.5+HCSPAC
    x22=x11+4CSPAC
    X44=XST(1)-0.5+HFSP43
    x ? 3 = x ? 4 - 4 = 5 P A 3
    FT1=0.5+(BETAN(1)+BETAM(1))/ SQRT((1.+xR1)+(xST(1)-xR1))
    FT2=0.5*(3ETAM(1)+8ETAM(2))/ SQRT((1.+xR2)*(xST(1)-xR2))
FT3=0.5*(3ETAM(_P4-1)+8ETAM(_PM-1))/ SQRT((1.+xR3)+(xST(1)-xR3))
    #T4=U-5+(3ETA4(LP4-1)+3ETAV(LP4))/ SQRT((1-+XR4)+(XST(1)-XR4))
    FT14 = SQRTCCXST(2)-(R1)/(XST(3)-XR1))
    #T2A = SQRT((xST(2)-xR2)/(xST(3)-xR2))
    #T34 = $27f((X$T(2)-(33)/(X$T(3)-X33))
#T44 = $07f((X$T(2)-X34)/(X$T(3)-XR4))
    FT1 = FT1+FT1A
    FT2 = FT2+FT24
    FT3 = FT3+FT3A
```

```
XIB=2. * SQRT(HSF61) * BETAN(1) / (AB2*(-1.-Y))
      KIBA = SBRFC(XST(2)+1)/(XST(3)+1.))
      XIE = XIS+XIBA
      xI1=xI1+xI3
      1A9\884 (41X+811+X123+X14) +A83/PA1
      XI=XI+&EC+4_03((XST(1)-Y-45°5)/(1.+Y-45P61))/PAI
      xxII=-xI
   35 CONTINUE
2----I2-----
C----SINGULAR INTEGRAL.
      YAWYNA JARDETVI RALGULA A SA CETAERT ZI ZIFT TUE
      ISIC=3
      XCAFY
      CALL ICZISR.SM.XCA.ISIC)
      XXI2=SR
      ARGL=(XST(1)
      IF (ARGLaLTABA) ARS.=-APS.
      XX12=KX12+A33+AL33(433_)
      XXIS=-XXIS
.SELTARCALE ZZUAG-VERREBED EZL
      AU(I) ARE ALREADY CALDULATED IN SUBROUTINE FIINTL
      .TVEMETATE VCHCO VE SEH CTNC CESSAG GVA
     XXI3 = 0.
      3°C5 = (xST(1)+xST(2))+.5
     C485 = (XST(2)-45T(1))+.5
      A31 = (8PC5+1.)/CM85
      A32 = (-8705+XST(3))/0495
      DO 120 ISUM = 1+NCHBY
      HA1 = 1 -- AJ(ISJY)
      142 = (AJ(ISUM)+A31)+(A32-AJ(ISJM))
      SHA2 = SART(HA2)
      =313 = HA1/SHA2
      =3A13 = C435+AJ(ISU4)+3PC5-Y
  120 XXI3 = XXI3+F3I3/F34I3
      XYI3 = XXI3+PAI/NCH3Y
      JJ22 = COS(ALFA1+GA44A)/COS(XST(5)+GA44A)/XST(6)
      HX3 = CCC1+AL3G(UU22)/PAI
      EXH*EEA*EIXX = EIXX
     USE CHEBYSHEV-GAUSS BUADRATURE FORMULA---
IN CETALULATE ALREADY CALCULATED IN
      SUPPOUTINE FIINTL AND PASSED ONTO HERE BY
      COMMO. STATEMENT.
      FPC5 = (XST(3)+XST(2))+.5
      F405 = (xST(3)-xST(2))+.5
      441 = ( = C = C5+1.) / F4C5
      A42 = (FPC5-XST(1))/F4C5
      XKI4 = 0.
      YEHOM: = 1.NCH3Y
      RAX = (36IAN2(ISJ4)+PAI)+(1.+AJ(ISJ4))
      R3x = (AJ(ISUM)+A41)+(AJ(ISUM)+A42)
      SRBX = SGRT(RBX)
      RCK = RAK/SRBK
      ROX = FMC5+AJ(ISUM)+FPC5-Y
 130 XXI4 = XXI4 + RCY/RJX
XXI4 = XXI4+PAI/NCHEY
      XXI4 = -XXI4+A83/7AI
```

```
= T4 = = T4 + FT44
    FR1=(FT1-F4A)/(XR1-Y)
    FR2=(FT2-FAA)/(XR2-Y)
    FR3=(FT3-FAA)/(XR3-Y)
    FR4=(FT4-FAA)/(XR4-Y)
    xIP1=J.5+105PAC+(FR1+FR2)+0.6+4FSPAC+(FR3+FR4)
    #IP2=0.25+HCSPAC+(FR2+FA(2))+0.25+HFSPAC+(FA(_P4-1)+FR3)
    XI23=XIP1+XIP2
    X41=21.
    X412=42.
    4U=21
    42=40-2
    _>44=_>4-5
    IF(IL2.GE.LPMA) X4I=101.
    I=(IJ2.GE._3MA) X412=202.
    IF (1U2.SE.LPMA) MU=131
    I=(IJ2.GE._2MA) 42=4J-2
    BETY=(BETANCLPM)-BETA4(LPM-1))/xMI2
    SESS=3.5*(BETANCLPM)+BETAMCLPM-1))
    4525=0.5+4=5PAC/X4I
    F13=FR4
    BETY1=(BETAM(1)-BETAM(1))/XMI2
    3ESS1=0.5+(3ETAM(1)+3ETAN(1))
    43961=0.5*405PAC/X4I
    F331=FR1
    xI1=0.
    4 [ 4 = 0 .
    DO 129 IL=1.M2.2
    F31=F33
    FG11=FG31
    (2=xST(1)=4SP5+F_DAT(4J-I_)
    X3=X2+4SP5
    X21=-1.+HSP61+F_DAT(4J-IL)
    X31=X21-H5751
    SETA2=BESS+BETY+FLOAT(IL)
    BETA3=BESS+BETY+F_CAF(IL+1)
    BETA21=BESS1-BETY1+FLOAT(IL)
    BETA31=BETA21-BETY1
    FJ21=3ETA21/ SGRT((1.+x21)*(x5T(1)-421))
FJ31=3ETA31/ SGRT((1.+x31)*(x5T(1)-431))
    FJ21A = S3RT((XST(2)-421)/(45T(3)-421))
    FUBIA = SGRT ((XST(2)-X31)/(XST(3)-X31))
    FJ21 = FJ21+FJ21A
    FU31 = FU31+FU31A
    F321=(FU21-FAA)/(x21-Y)
    F331=(FU31-FAA)/(X31-Y)
    FJ2=6ET42/ SGRT((1.+x2)+(xST(1)-x2))
FJ3=6ET43/ SGRT((1.+x3)+(xST(1)-x3))
    = J2A = SGRT((XST(2)-X2)/(XST(3)-X2))
    FJ3A = SGRT((xST(2)-x3)/(xST(3)-x3))
    FJ2 = FU2+FU2A
    FJ3 = FJ3+FJ3A
    F32=(FU2-FAA)/(x2-Y)
    #43=(#U3-FA4)/(X3-Y)
    #I1=#I1+4$P51+(F211+F221+4++F231)/3+
129 XI4=XI4+MSP6+(FG1+4++FG2+FG3)/3+
    XIA=2.+SGRT(H5P6)+BIFAN(LP4)/(A32+(4ST(1)-Y))
    XIAA = SGRT((XST(2)-(ST(1))/(XST(3)-XST(1)))
    XIA = XIA+XIAA
    XI4=XI4+XIA
```

```
SUBROUTINE OFSIMS(AVS5)
      DIMENSION 5288(101)+524ER(101)+(ST(5)
      COMMON YCOU.SBETA2
      COMMON XIT+(200)+XITN(200)+AVSG2S(200)+SARC2(200)
      COMMON CAVALIBAD .CAVY(188) .BETAB.BETAC.XCCC.NCAV.LPMM.NS2
      COMPONIAUCLICO)+ISAARP+VEHER+VEHEVYERSVELOVISOR (COLICERALE)
      COMMON FLAPANODELTAGOGAPALFALOGAMMA
      COMMON SIGMA, SEETA, x (M. ICPI, SARCOD (513)
      COMMON TOLLOXAGABOXCOFANGOEPONCONROLBESSORIALS BEGSOSMALSOCS
      COMMON XSV(6),CCC1.CLE.ERC.YYY.XM.ITERA.SXSIO(6),SXSIO0(6).YXS(6)
      COMMON PSIZ+LP+SARC(513)+SARCD(513)+LPM+DE
      COMMON PETAN(513)+BETAM(813)+IU+LPK+XII(200)+XUJ(200)+XOX
      COSC. EESE, AASA, CULCAX NOPPCO
      CUANOM (001) 2U ADM (001) 2UACT + 6C+ 6C+ 6E+ 4.5 + 5CCCC+ 6BEE+ AAA + VCPMCC
      P4I=3-141592554
      THIS SUBROUTINE CALLED FROM DKEVEW.
      USE SIMPSONTS RULE.
      33 1 143 = 1.5
    1 XST(IMO) = YXS(IMO)
      COE = COSCOELTAD
      SDE = SINCHELTA)
  NS2 SHOULD HAVE A FACTOR OF 4.
: V$2=_244=_242
      YS21 = NS2+1
      VS24 = VS2-1
      S2G4P = (xST(3)-xST(2))/NS2
      JJ2 = CJS(A_FA1+3A44A)/COS(XST(5)+3A44A)/XST(6)
                                   LUS = COS) ALTREAPHACYCCS)XZT) & (+CAPHAC
      JC 2 IS2 = 1. VS21
      452 = 45T(2)+32GA2+([32-1)
      440 = X$2+00E
      ECC+(+)12x-SZX = CAPX
      XMAS2 = XMAS+#2
      ASD = XST(4)+CDE
      4502 = ASD**2
      Dadx = DGAP+XKD/((x4452+ASD2)+PAI)
      IF (IS2+E3+1) 30 TO 3
      4 CT CE (152.EL.VS21) 90 FD 4
      CALL 32 (XS2.4NSG2.132)
      32 CALCULATES G2 WITH XSI SIVEN.
      E32 = EXP(-ANSG2)
      I=(IJ+EG+27) ANSG2S(IS2)=ANSG2
      S2KER(IS2) = E62*3w3K/JJ2
      33 10 2
    3 CONTINUE
      SEKER(1) = DWDX/SERT(1.+SIGMA)
      ANSSES(ISE) = ALGG(SERT(1.+SISMA)/UJE)
      23 [3 2
    4 CONTINUE
      SEKER(NS21) = DEDX/JJS
      AVS323(IS2)=0.
    2 CONTINUE
      S2SR(1) = 0.
  00 10 JS2 = 1+NS2A+2
10 S2S7(JS2+2) = S2S7(JS2)
     1+(S2KER(JS2)+4.*52KER(JS2+1)+S2KER(JS2+2))+523A7/3.
      I=(IJ-NE-27) GG TG 43
      54322611=0.
      DO 50 ISARC=2.NS2.2
   50 S2SR(ISARC) = .5 + (S2SR(ISARC-1) + 52SR(ISARC+1))
```

DD 30 ISARC=1+NS21
30 SARC2(LSARC)=S2SR(ISARC)
+0 CONTINUE
ANS3 = S2SR(NS21)
RETURN
END

• •

```
SUBROUFINE IC2(SR.SM.KC4.ISIC)
   DIMENSION KKER1(100) (KKER2(100) (KST(6)
   COMMON & CCC+ SBETA2
   COMMON SAVX(100).XIFN(200).ANSS2S(2)).SARC2(200)
COMMON SAVX(100).CAVY(100).BETAB.BETAC.XCCC.NSAV.LPMM.NS2
   COMMON AU(130)+ISHAY2+NCHBY+BBTAN(130)+BBTAN2(100)+SETAN2(100)
COMMON FLAPAN+BETA+DSAP+ALFA1+GAMM4
   COMMON SIGMA+SBETA+XXM+1CPI+SARCOD(513)
   SSG-SAMALS-SBIE-SELELY-SELEL-FY-C-F-E-E-EVAR-EX-AX-LUI NOFFCD
   COMMON XSN(5), CCC1+CLE, ERC+YYY+KM+ITERA+SXSIO(6)+SXSIO0(6)+YXS(6)
   COMMON PSIZ+LP+SARC(513)+SARCO(513)+LPM+DE
   COMMON BETAN(513)+BETAM(513)+IJ+LPK+XII(200)+XJJ(200)+XDX
   30 1 IPV = 1.5
 1 (3T(I24) = fxS(I24)
   XX1 = XST(4) + SIN(3E_TA)
   (41_EC)200+(4)12x = 1YY
   YY12 = YY1 ** 2
   ISIC = 0 FOR RMINE
        # 1 IN CAVITY OF OFSIME FOR FEED AND IN CAVITY.
          2 CALLED FROM FIRST FOR F(1).
3 FOR I2 OF F(4).
   SR=C.
   34=0.
   34=xST(1)*.5
   3440=34-x31(2)
   3491=34+1.
   344F=34-XST(3)
   311=B44C/34
   512=8HP1/9H
   313=544F/34
   IF(ISIC+NE+3) to TO 20
   API=(XCA+1+)+(XSTE1)-XCA)+(XCA+XST(3))
   492=X34-XST(2)
   425=S4RT(421/4F2)
30 CONTINUE
   DO 7 ISUM=1.NCHBY
   RA=(AJ(ISJ4)+3I1) +(AJ(ISJ4)+1+)
   R8=(AJ(ISJM)+312)+(AJ(ISUM)+813)
   SAB=SART(RA/RB)
   $4C=8+ * SGRT(1.-4J(ISJ4) **2) / SAB
   nE+(MLZI)LA*FE=FIZX
   X2X2=(S]2-xX1
   XPX=2=XFXr**2
   ₹ √ 2 = x = x = ≥ + Y Y 1 2
   RUR=XPXF/RV2
   R = I = Y 1 / R / 2
   IF(ISIC.EG.1) RhR=1./(XSIP-XCA)
   IF([S[5.E3.2) R#R=1.
   I=(ISI3.62.3) R4R=(1.-SA3/APS)/( XSIP-XCA)
   SR=SR+SAR+RJR
 7 SM=SM+SAB+R#I
   PAI=3-141592654
   SR=SR*PAI/NCHBY
   S4=SM+PAI/VCHBY
   PRUTER
   CVE
```

```
SUBROUTINE FIINTL(YINT. KCTRL)
   CCC1) ELF. (6) TEX MOLENBELC
   COMMON YCCC+SBETA2
COMMON YCCC+SBETA2
COMMON XITM(200),xITM(200),ANSS2S(200),SARC2(200)
   COMMON CAVX(100).CAVY(100).BETAB.BETAC.XCCC.NCAV.LPMM.NS2
   COMMON AU(100)+ISHAR+ NCHBY+BBIAN(100)+BETAV2(100)+BETAV2(100)
COMMON FLARAHOELTA+DERP+AFAL-SAMM1
   COMMON SIGMA-SBETA-KKM-ICPI-SARCO(613)

COMMON IDJ-XA-KB-XC-FANG-EP-YC-YR-JBIGS-XL3I3S-BIGS-SMALS-DSS

COMMON XSN(6)-CCC1-CLE-ERC-YYY-KM-ITERA-SXSIO(6)-SXSIOO(6)-YXS(6)
    COMMON PSIZ+LP+SARC(513)+SARC2(513)+LPM+DE
   COMMON BETAN(513) + BETAM(513) + IJ+LPK+ XII(200) + XJJ(200) + XCX
   COSTREES AASA+GULCAX VOMPCO
    COMMON AAAA.BBBB.CCCC.AB.BB.CB.CB.T3AJS(100).4GAJS(100).7GAUS
    SUBROUTINE FIINTE CALCULATES THE INTEGRALS IN F(1)
   ISHAR? = 1 FOR SHAR? L.E.FDILS.
   ISHARP = 1 FOR ROUNDED L.E.FOILS.
LF FOLLS AVE ROUNDED L.E. CHERY-SAUSS
    SUABRATUE
   ATER SOVIE FORMULA CAN NOT SE USED. SINCE SETA
   .VCITC/LE HIGGHE A TON EI
    NORBY - NUMBER OF CHEBYSHEV-SAUSS QUADRATURE CONTROL POINTS.
   P41 = 3.141592654
    IF (ICPI .EQ. 0) GO TO 3
   33 70 13 = 1.6
70 \times ST(I2) = \times SN(I2)
   30 TO 12
 9 33 11 I + = 1 + 5
(HI)2XY = (HI)72X
BUNITACS SI
 5 341 = (XST(1)+1.) *.5
   3 \times 2 = (XST(1) - 1 - 1 - 3 + - 5)
   A11 = (3N2+XST(2))/3N1
   A12 = (DN2-XST(3))/DN1
   205 = (xST(1)+xST(2))+.5
    CM25=(xST(2)-xST(1))+.5
   A51 = (805+1.)/0485
   A32 = (-805+XST(3))/CM85
   FCA5 = (XST(3)-XST(2))+.5
   #015 = (XST(3)+XST(2))++5
    A41 = (FC15+1+)/FCA5
    A42 = (FC15-XST(1))/FCA5
    SPACE2 = (XST(3)-XST(2))/2244
    READ LAMM FOR THE SECOND ARC.
    IF (KCTRL-3E-2) 50 TO 100
    I=(IJ.3E.2) 63 TO 126
   CSPACE = (1.+XST(1))/FLDAT(_PK)
FSPACE = DSPACE/FLDAT(_PM+_PK)
    134 = 1
    XCHCK = -1.
    SPACE=CSPACE
    DO 20 ICHBY=1.NCHBY
    ACH=NC484-ICH34+1
    AJ([C+8Y)=C3S((2*NC+-1)*PAI/(2*NC+8f))
    SVC+(YEHDI)UA*IVC=12>X
    IF (ITERA-E2-1) 30 TO 433
22 IF (XCHCK.3E.X(SI) 33 TO 21
    IF (ID4.GE.LPK) SPACE = FSPACE
   XCHCK = XCHCK+SPACE
134 = 104+1
```

```
SS OT CC SHEET) IZX ATE ZTZIXE IZ>>
    21 CONTINUE
        IOMA = 104-1
        (CAPCI) VATES + (PCI) VATES + (PCI) VATEE = (YEF) I) VATEE
       X + (XKSI - XCHCK) / SPACE
       BETAN IS USED FOR CHEBYCHEV-SAUSS INSTEAD OF BETAN.
        30 TC 20
   ABB BBTANCICHBY) = SBETA
I BETAN FOR ITERA-ED-1 IS SPECIFIED IN OFSIMI.
    26 CONTINUE
   LIG CONTINUE
        IF(+CTRL+E4+4) 30 TO 4
       *1 = 1/1t
       CS 110 ISUM = 1.NCH3Y
(AUCI)UA)(I1A+(MUZI)UA)+A12)
   110 YINT = YINT +85TAN(ISUM)+SORT(A8C)
        YENT = YIVT+PAI/NCHBY
    SO TO 1000
LO CONTINUE
D I FAIR IN THE DARE OF HAVOLING RADED L. E. .
       NOF = 9
        XCA = 0.
        CALL OFSIMICYINT+NOF+XCA)
        * ABPACOT (E) FOR CEEL YUNC . YPPUC EI ADK
        30 TO 1000
     2 CONTINUE
        * CA = G.
S XIA IS DUMMY.
        ISIC=2
        CALL IC2(SR.SM.XCA.ISIC)
        FZ=1/1Y
       30 TO 1000
     3 CONTINUE
   ----INTEGRAL FOR 13.
CENTRE CAUCULATED AND STORED
       YINT = J.
        YEF 57 . 1 = 4 LC I 05 1 CC
        (PL21) LA-. 1 = 16A
        ((PLZI)LA-SEA) + (IEA+ (PUZI)LA) = SEA
        SGAB2 = SGRT(AB2)
  26A52 - 364
26A52 16A = 26A
26A+1VIY = TVIY 021
        YEHON\IA9*TVIY = TVIY
TINI = TINI-FRANCO.S.

SO TO 1030

SINCE BETAKNO BENN IST AND IFT ARE

EXPECTED TO BE ALMAYS SMOOTH, USE GAUSS—

CHEBYSHEW AJADARTIRE FORMULA.
       AJ(N) IS ALREADY CALCULATED.

IF THIS IS THE FIRST CASE FOR BETANZ.

JSE A CONSTANT FOR BETANZ.

BBTANZ IS JSED FOR CHEVY-SALAS INSTEAD OF BETANZ.
     4 CONTINUE
IF(ITERA.GE.2) GO TO 150
IF(IJ.GE.2) GO TO 131
S BETA2 MUST BE READ FOR THE FIRST RUN.
```

```
33 189 ICHBY = 1.NCHBY
 130 BBTAN2 (ICHBY) = SBETA2
      VS21=VS2+1
      00 185 IOC=1.NS21
 135 BETAN2(10C) = SEETA2
30 FO 181
 150 CONTINUE
      I=(IJ.SE.2) SD TD 181
      1344 = 1
      XCHCK = XSI(2)
      33 173 ICHBY = 1.4843Y
      XKSI = FCA5+4J(ICHBY)+FC15
 152 1= (KC1CK-5E-XKSI) 30 TO 151

XCHCK = XCHCK + SPACE2

1044 = 1044+1
 30 TO 152
131 CONTINUE
      IDMMA = ID44-1
BETAN2(IC48Y) = BETAN2(IOMM)
     I+(BETAN2(ID4M)-BETAN2(IDMMA))+(XKSI-XCHCK)/SPACE2
      ILM=ICHBY
      XXSI = FGA5+AU(ILM )+FC15
      WRITE(6+250) ILM+33TAV2(ILM)+X4SI
 250 FORMAR(15x++1=++13+2x++38Ta42=++E14+7+2x++X<SI=++E14+7)
 170 CONTINUE
      *1 T = 0 .
      YEHON = PLZI 001 CO
(PLZI)LA+.1)*(IAC+(PUZI)SVATGG) = 1EA
(SEA+(PLZI)LA)*(IAC+(PUZI)LA) = SEA
      SGAB2 = SGRT (AB2)
 YINT = YINT + AB1/SPAB2
YINT = YINT+PAI/NCHBY
1000 CONTINUE
      RETURN
      GFE
```

manager . . .

```
SUBROUTINE CAVITY (KODAYCC)
S THIS SUBROUTINE IS CALLED FROM DAFNER FOR F(5).
              D[4548104 CKEX(100)+SKEY(100)+ANSI1(100)+SRI2(400)+SIC313(100)
               (4) TEX+(COI) PI+DIE NCIENZPIC
               DIMENSION CAVXX(130) + CAVYY(100)
C3440N YCCC+S3ETA2
              COCS)SORAR, (CCS)SCRAR, (CCS)VTIX, (CCS)VTIX VORMCO
SRR, PPQ_, VACR, CCCS, VACR, EATGE, (COS)VVAC, (COS)VVAC VOPPCO
               COMMON AJ(100) . ISHAR -, NCH8 + 68 TAN(100) . 88 TAN2(100) . 38 TAN2(100)
              COMMON FLAPANOSELTA-DBAP-ALTAI-GAMA
               COMMON SIGMA-SBETA-((4-ICPI-SARCO)(513)
               COMMON IDUL.XA.XB.XC.TANG.EP.YC.YR.JBISS.XLBISS.BIGS.SMALS.DSS
               COPHON XSV(5),CCC1,CLE,ERC,YYY,KM,IFERA,SXSIO(5),SXSIO(6),YYS(6)
               COMMON PSIZ-LP.SARC(513).SARCD(513).LPM.DE
               23440V BETAN(513) +BETAN(513) +1J+LP(+XII(200) +XJJ(200) +X3X
COMMON XROUND-ACAL-BESB+C2CC
CD440A ACAL-BBB+C2CCC+C5+BB+C2CC+C00)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)+WGAUS(100)
              SCSM = SGRT(1.+SISMA)
               DOEL = COSCOELTA)
               SDEL = SINGUELTA)
               PAI = 3.141592654
          00 1 _0A = 1.5
1 x5((_0A) = YX5((_0A)
               DESVACE
               NCAVI=NCAV+1
               CAVS = (XSF(2) - KSF(1)) / NCAV
              LEAVE THE LAST POINT OF XSI = 0 SINCE THERE IS A , SINCULARITY FOR SINGLE SPIRAL VORTEX MODEL.
               DD 2 KLM = 1.NCAV1
              XCA = XST(1) +CAVS+ (<LM-1)
REAL PART OF OMEGA = BETA+ PAI+
               I= (KLM.E3.1) G0 T0 3
IF(<L4.E2.NZ4V1) GD FD 19
D-----EC1(XXI) CALCULATION. CALLING OFSIM1.
              IF (IJ.68.34) GD TD 75
               40F = 3
               CALL DESIMICANS, NOF+ (CA)
               .ALX DE LACITUREDI EL ICX . (ICX) LOT FCE VCITLLES A EL SVA
               IF (IJ.EU.27) ANSII(K_M) = ANS
              30 ro 76
       75 ANS = ANSII(KLM)
       75 CONTINUE
 C---- IC2(XSI) CALCULATION.
               I=(IJ.3E.34) GG TO 77
               ISIC = 1
               CALL IC2(SR+SM+XCA+ISIC)
               DALY SE IS STILIZED -- SA IS FOR RAINT.
               I= (IJ.EQ.27) SRI2(<_4) = SR
               33 TO 78
       17 SR = SRI2(<-M)
       79 CONTINUE
        --- IC3 ((SI) CALCULATION-- USE CHERYSHEV-GAUSS
               QUADRATURE FORMULA.
               3°25 = (x$T(1)+x$T(2))+.5
               C485 = (xST(2)-xST(1))+.5
               A31 = (8PC5+1.)/C485
               A32 = (-8905+XST(3))/0485
               E(1 = xCA-xST(2)
               E(2 = (xCA+1+)+(xCA+(ST(1))+(XCA+(ST(3))
```

```
EK3 = SGRT(EK1/EK2)
      EF38 = CM85*EK3
      IF (IJ.GE.34) GO TO 90
      SIC3 = 0.
      YEHON : 1 NUZ1 & CC
      EJ1=(AJ(ISJM)+A31)+(A32-AJ(ISJM))
      SEJ1 = S2RF(EJ1)
      E=3 = (1.-AJ(ISUM))/SEJ1
      EF34 = CM35+AJ(ISJM)+3PC5-XCA
    5 SIC3 = SIC3+(EF3-EF38+SQRT(1.-AJ(ISJM)++2))/EF34
      SIC3 = SIC3+PAI/NCH3Y
      SIC3 = SIC3+ALCG((XST(2)-XCA)/(XCA-KST(1)))+E43
      I=(IJ_0E3_027) SIC3I3((I_04) = SIC3
      32 TD 31
   30 SIC3 = SIC3I3(KLM)
   SENITION IE
     -104(xSI)----.
      USE CHEBYSHEV-GAUSS BUADRATURE FORMULA
         IN THE SAME MANNER AS THAT FOR IT IN
         3F5143.
      IF(10.3E.34) 30 TJ 32
      FPC5 = (XST(3)+XST(2))+.5
=405 = (XST(3)-XST(2))+.5
      A41 = (FPC5+1+)/FMC5
      A42 = (FPC5-XST(1))/#4C5
      SIC4 = 8.
      YELDA - 1 - NCHBY
      ((PL21)LA+.13+(14+(PL21)SVATEE) = AF
      RB = (AUCISUM) + A41) + (AUCISUM) + A42)
      SRE = SORT(RE)
      RC = RA/SRB
      RD = FMC5+AJCISJM)+FPC5-XCA
    7 SIC4 = SIC4+RC/RD
      SIC4 = SIC4 PAI/NOHBY
      IF(IJ.ER.27) SIC4[4((L4)= SIC4
      50 TO 83
   32 5104 = SIC414(KLM)
   3UVITYCO EE
1 C(XSI) = 1/EK3 ALREADY DALOJARED.

UJC = COS(ALFA1+GAMMA)/COS(XST(5)+GAMMA)/XST(5)
         = (-AYS/PAI+SR+(0001-AL03(JJ2)/PAI)+SIC3
     1-3104/2411/EK3
      30 TC 25
30 = 35TA3+PAI
      30 TG 25
   10 GC=SETAC+PAI
I BETAB AND BETACK BODY ANGLES AT B AND C) MUST BE SPEICIEED IN COMMON.
   25 CONFINUE
      KKS = KCA+CDEL
      YYT = XCA-XSTE4) +SDEL
      YTT2 = YYT ++2
      XXU = XST(4)+CDEL
      XXJ2 = XXJ++2
      XY9 = YYT2+XXU2
      CIAC+EXX)(XY3+PAI)
      CGC = COS(GC)
      SGC = SIN(GC)
      CFC = DADX/SCSM
      CKEX (KLM) = CSC+CFC
SKEY (KLM) = SGC+CFC
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SUBROUTINE G2 (XS2+AG2+IS2)
                    xST(6), x1215(200), x1225(200), x1235(200), x1245(200)
      NCIENZPIC
      SATBER . CCCY VORYCO
       COMMON XITH(200) + XITH(200) + ANSJ2S(200) + SARC2(200)
      234434 DAVK(100)+3AVY(100)+3ET43+3EF4C+XCCC+N3AV+LP44+N32
      COMMON AUC100)+ISHARP+NCHBY+83TAN(100)+88TAN2(100)+38TAN2(100)
      COMMON FLAPAN-DELTA-DGAP-ALFA1-GAMMA
      COMMON SISMA+SBETA+XX4+ICPI+SARCOD(513)
      CDMMON IDJL.XA.X8.XC.FTAVG.EP.YC.YR.JBIGS.XLBIGS.BIGS.SMALG.DSS
      COMMON XSY(5) + CCC1 + C_E + ERC + YYY + XM + ITERA + SKSIO(6) + SXSIOO(6) + YXS (6)
       COMMON FSIZ.LP.SARC(513).SARCO(513).LPM.DE
       234434 BEF44(513)+6EF44(513)+[J+LPK+XII(200)+XJJ(200)+XJX
      COMMON XROUND, A 2AA + 3 235 + C 200
      2UAD// (201) 2LAEL+ (201) 2LAET+8C+8C+8C+8C+8C+8C+8C+AAA - VOPMCC
      THIS SUBROUTINE IS CALLED BY DESIME.
(HIS SUBROUTINE CALCULATES FUNCTION G2(XS2) WHICH
      INCLUDES [21(xS2) TO [24(xS2).
      XS2 IS XSI- AG2 IS THE SOLUTION OF INTEGRALS.
      33 1 132=1.5
    1 XST(IQP)=YXS(IQP)
      PAI = 3.141592654
      IF (IJ.SE.34) GO TO 100
---- [21(xSI)----
      THE SAME INTEGRATION AS THAT IN
      SUBROUTINE CAVITY FOR SC(XSI)
      V3= = 3
      CALL DESIMICANS+NOF+X52)
      XIZ1 = ANS
      I=(IJ-EG-27) \times I21S(IS2) = \times I21
---- 122(xSI) ----
      USE THE SAME SUBROUTINE ICE AS
      USED IN CAVITY WITH ISIC=1.
      ISIC=1
      CALL IC2(SR.SM.XS2.ISIC)
      X122 = SR
      NOTE THAT SM IS DUMMY VARIABLE.
      I^{\pm}(IJ_{\bullet}EB_{\bullet}27) xI225(IS2) = xI22
2---- [23(XSI)----
      USE CHEBYCHEV-GAUSS BUADRATURE FORMULA
        VI TART OF SERVAR SALIRIE VETSAKE VI
         GESIM3 FOR 13.
      x123 = 0.
      9PC5 = (XST(1)+XST(2))+.5
      1485 = (xST(2)-xST(1))+.5
      A31 = (8PC5 + 1+)/CM35
A32 = (-8PC5 + XST(3))/CM35
      YERCK = PUZI S CC
      HA1 = 1.-AJ(ISUM)
      HA2 = (AJ(ISU4) + A31) + (A32-AJ(ISJ4))
      SHA2 = SQRT(HA2)
      F313 = 441/5442
      #3A13 = C485+AJ(ISJ4)+8*C5-(S2
    2 x123 = x123+F313/F3A13
      X123 = X123+PA1/NCH3Y
      IF (IJ_0EG_027) \times I23S(IS2) = \times I23
      USE CHESYCHEV-GAUSS QUADRATURE
         TAPT EVIPLEZA YE ALEPET
         THE KERVEL FON. IS SHOOTH.
      HU = (XS2+1.)+(XS2-KST(1))+(XST(3)+(S2)
```

```
1/ = ($2-4$[(2)
    He = SQRT(HU/HV)
    FPC5 = (XST(3)+XST(2))+.5
F4C5 = (XST(3)-XST(2))+.5
    A41 = (FPC5+1.)/F4C5
    A42 = (FPC5-KST(1))/F4C5
    x124 = C.
    00 10 ISU4 = 1. NOH3Y
    TPA1 = AJ(ISUM)+A41
    TPA2 = AJEISU4)+A42
    SIP = SQRT(TPA1+TPA2)
    F4T = (36TAN2CISU4)+24I)+(1.+AJ(ISJ4))/STP
    BBIANZ IS CHEBY-GAUSS VERSION FOR BETA ON THE SECOND ARC.
    F+A = FMC5+AU(ISUM)+FPC5-XS2
    SI2 = SIRT(1.-AJ(LSJ4)++2)
    F48 = F405 +ST2+(3ET4N2(IS2 )+P41)/4%
 10 XI24 = YI24+(F4T-F43)/F4A
    XI241 = XI24*PAI/NCHBY
    351412 IS USED FOR SIARSONTS RULE:
4L5 = ALGG((XST(3)-(S2)/((S2+(3T(2)))
    IS2 IS TRANSFERRED THROUGH 32-ARGUMENT.
    x1242 = x_3+(3ETAV2(152)+PAI)/H#
    XI24 = XI241+XI242
    I=(IJ_0=3.27) \times I245(I52) = \times I24
    30 TO 101
136 xI21 = xI215(IS2)
    4122 = X1225(152)
    x123 = x123S(IS2)
    x124 = x1245(152)
101 XS2A = -XI21/PAI-XI22
    xs28 = CCC1+ALOG(COS(A_FA1+3A44A)/C)S(xST(5)+3A44A) /XST(6))/PAI
                 IAP/))A44A3+)5(TSX(SCC/)AMMAG+1AF_A(SCC(GOLA-1CCC = 32SC
    x520 = x523 + x123
    XS23 = -X124/3AI
    452 = (xS24+xS2C+xS23) +H#
           251-421x-321x-221x-121x )25-6(ETIR= )2-9E-251-0N4-72-9E-JI( FI
          2SI,42IX,32IX,22IX,12IX )25,5(ETTR# )01.gE.2SI.0NA.72.gE.JI( FI 2SI,42IX,32IX,22IX,12IX )25,5(ETTR# )02.gE.2SI.0NA.72.gE.JI( FI
               •X2+)X2+7-41E(4++---ERA )5(F FO 41+31+21+11---++XC1(TARRCF 25
                                                                     )41+==251+ A
    RETURN
    END
```

```
SUBROUTIVE RAINT (SR.SM.MIZ)
    DIMENSION KST(6)
    COMMON YCCC.SBETA2
    C34434 XIT4(200) +XIT4(200) + 445325(233) + 5ARC2(203)
    COMMON CAVX(100)+CAVY(100)+BETAP+BETAC+XCCC+NCAV+LPMM+NS2
    COMMON AUGIOOD FIRMARY NICHBY BETANCIDO BETAN2 (100) BETAN2 (100) COMMON FLARAL FARAL FARMAN
   COMMON SIGMA-SBETA-444-1CPI-SARCOD(513)
COMMON IDJL-XA-X5-XC-FANG-2-47C-YR-JBIGS-KLBIGS-BIGS-SMALS-CSS
    COMMON XSN(6)+CCC1+CLE+ERC+YYY+XM+IFERA+SXSIO(6)+SXSIO(6)+YXS(6)
COMMON PSIZ+LP+SARC(513)+SARCO(513)+LPM+DE
    COMMON BETAN(513) + BETAM(513) + IJ + LPK + XII(200) + XJJ(200) + XOX
    C3S3+66S6+44SA+CRCHX VCPPCC
    00440V AARA,8383,0000,A8,83,08,08,73AUS(100),#GRUS(100),NGAUS
   PAI = 3.141592654
IF (12P1.53.0) 50 TO 10
   20 12 15 = 1.6
12 \times ST(15) = \times SN(15)
   30 TO 11
13 33 ! IS = 1.6
 1 xST(IS) = YXS(IS)
BLVITVCS 11
   x \times 1 = (ST(4) * SIV(35_T4)
   (AT_3C)200*(A)T2x = 1YY
   YY12 = YY1 ** 2
   C95 = (XST(2) - XST(1)) * .5
   305 = (XST(1) + XST(2)) + .5
   431 = (305+1.)/335
   A32 = (-805+xST(3))/085
   3415 = (XSF(1)-1.)+.5
   3^{9}15 = (xST(1)+1.)*.5
   A11 = (3M15-XST(2))/3°15
   A12 = (5M15-XST(3))/3915
   FPC5 = (XST(3)+XST(2)++5
   F4C5 = (XST(3)-XST(2))+.5
   A41 = ( PC5+1.) / FMC5
   442 = (FPC5-xST(1))/F4C5
   1 CT CC (4.03.61M) =1
   IF (MI2+E3+3) 50 TO 3
   L= (MIQ.EQ.2) GD TO 2
   AUCI) ARE ALREADY CALCULATED IN SUBROUTINE
         ** FINTLE AND STORED IN COMMON AREA
   SR=2.
   54=3.
   30 20 ISU4 = 1+NC+9Y
   3 \times 1 = 1 - 4 J(ISJ4)
   GY1 = (AU(ISUM) + A31) + (A32 + AJ(ISJM))
   SSY1 = SQRT(GY1)
   F73 = 3X1/S3Y1
   FX1 = C85+AJ(ISJM)+815
   FK2 = FX1-KX1
   Fx22=Fx2++2
   "X3 = "X22+YY12
   FF31 = FY2/FX3
   ==32 = YY1/=X3
   SR = SR+FF3+FF31
20 S4 = S4+F=3+FF32
   SR = SR+PAI/NCHBY
SM = SM+PAI/NCHBY
   30 70 1000
```

```
2 CONTINUE
     I = (IS4AR - EQ. 1) 30 TO 100
     ISHARP = 1 MEANS THAT THE FOIL HAS ROUNDED LOED
SO THAT THE SIMPSONTS RULE IS USED.
ISHARP = 0 MEANS THAT THE FOIL HAS SHARP LOED.
SO THAT CHEBYSHEV GAUSS FORMULA CAN BE USED AS BELICHO
     St = 9
     S4 = 0
     30 30 ISU4 = 1. NCHBY
     ST11 = AJ(ISJ4)+A11
     ST12 = AJ(ISUM)+A12
      FK1 = BBTAV(ISUM)+SBRF(ST11/SF12)
     UN1 = BP15+AU(ISUM)+BM15-XX1
      JV12 = JV1**2
      UN13 = UN12+YY12
     F<11 = UN1/JN13
     F(12 = YY1/JN13
     SR = SR+FK1+FK11
  30 S4 = S4+F<1+F<12
     SR = SR + PAI/NCHBY
     S4 = S4+PAI/NCHBY
      30 TC 1000
 100 CONTINUE
     THIS IS THE CASE THAT THE FOIL HAS ROUNDED LOES
     NOF = 1
     ACA = 0.
     CALL OFSIMIESR , NOF , XCA)
  CCA IS DUMMY----DNLY USED FOR F(5) IN DXFNEW.
     YJF=2
      CALL DESIGNORANTE XCA
      30 [0 1000
   3 CONTINUE
      JSE CHEBYSHEV-GAUSS FORMULA SINCE BITA
     THIS REGION IS SHOULD .

THIST TA CETALULATE VEASALA SEA CHUZID SHATEE
     SR = 0.
     54 = :.
      76+50+1 = +L21 56 CC
     PSL = (BETAN2(ISUM)+PAI)+(1.+4J(ISUM))
     254 = (AJ(ISJ4) + (441) + (AJ(ISJ4) + 442)
     Sapsm = Sart(PSM)
      FF4 = 251/53254
     254 = FMC5+AU(ISUM)+22C5-XX1
     25.45 = 524.5
     ##41 = "SY/("542+7112)
     FF42 = YY1/(P$Y2+YY12)
     54 = 54+F=4+FF41
     $4 =$4+FF4+FF42
  SC CONTINUE
     SR = SR+P41/NCHBY
     S4 = S4.PAI/NCHBY
     33 F3 1693
   4 CONTINUE
     XCA IS DUMMY. DALY USED FOR ICE IN F(5)
     XCA = 0.
     1510 = 0
     SUBROUTINE IC2 IS ALSO USED IN F(5).
     14__ 102($2,$4,$4,X04,1510)
VELTER DEGI
     END
```

```
SUBROUTIVE SHAPE(X.Y.SETA.IS112)
                                 COMMON/FREECAV/YFREEC COMMON/FREEC COMMON/UPPER/AZAUA-3235U,CCCCU+AZAUA-3235U,CCCCU+AZAUA-3235U,CCCCU+AZAUA-335U,CCCCU+AZAUA-335U,CCCCU+AZAUA-335U,CCCCU+AZAUA-335U,CCCCU+AZAUA-335U,CCCCU+AZAUA-335U,CCCCU+AZAUA-335U,CCCCU+AZAUA-335U,CCCCU+AZAUA-335U,CCCCU+AZAUA-335U,CCCCU+AZAUA-335U,CCCCU+AZAUA-335U,CCCCU+AZAUA-335U,CCCCU+AZAUA-335U,CCCCU+AZAUA-335U,CCCCU+AZAUA-335U,CCCCU+AZAUA-335U,CCCCU+AZAUA-335U,CCCCU+AZAUA-335U,CCCCU+AZAUA-335U,CCCCU+AZAUA-335U,CCCCU+AZAUA-335U,CCCCU+AZAUA-335U,CCCCU+AZAUA-335U,CCCCU+AZAUA-335U,CCCCU+AZAUA-335U,CCCCU+AZAUA-335U,CCCCU+AZAUA-335U,CCCCU+AZAUA-335U,CCCCU+AZAUA-335U,CCCCU+AZAUA-335U,CCCCU+AZAUA-335U,CCCCU+AZAUA-335U,CCCCU+AZAUA-335U,CCCCU+AZAUA-335U,CCCCU+AZAUA-335U,CCCCU+AZAUA-335U,CCCCU+AZAUA-335U,CCCCU+AZAUA-335U,CCCCU+AZAUA-335U,CCCCU+AZAUA-335U,CCCCU+AZAUA-335U,CCCCU+AZAUA-335U,CCCCU+AZAUA-335U,CCCCU+AZAUA-335U,CCCCU-AZAUA-335U,CCCCU-AZAUA-335U,CCCCU-AZAUA-335U,CCCCU-AZAUA-335U,CCCCU-AZAUA-335U,CCCCU-AZAUA-335U,CCCCU-AZAUA-335U,CCCCU-AZAUA-335U,CCCCU-AZAUA-335U,CCCCU-AZAUA-335U,CCCCU-AZAUA-335U,CCCCU-AZAUA-335U,CCCCU-AZAUA-335U,CCCCU-AZAUA-335U,CCCCU-AZAUA-335U,CCCCU-AZAUA-335U,CCCCU-AZAUA-335U,CCCCU-AZAUA-335U,CCCCU-AZAUA-335U,CCCCU-AZAUA-335U,CCCCU-AZAUA-335U,CCCCU-AZAUA-335U,CCCCU-AZAUA-335U,CCCCU-AZAUA-335U,CCCCU-AZAUA-335U,CCCCU-AZAUA-335U,CCCCU-AZAUA-335U,CCCCU-AZAUA-335U,CCCCU-AZAUA-335U,CCCCCU-AZAUA-335U,CCCCCU-AZAUA-335U,CCCCU-AZAUA-325U,CCCCU-AZAUA-325U,CCCCU-AZAUA-325U,CCCCU-AZAUA-325U,CCCCU-AZAUA-325U,CCCCU-AZAUA-325U,CCCCU-AZAUA-325U,CCCCU-AZAUA-325U,CCCCU-AZAUA-325U,CCCCU-AZAUA-325U,CCCCU-AZAUA-325U,CCCCU-AZAUA-325U,CCCU-AZAUA-325U,CCCCU-AZAUA-325U,CCCCU-AZAUA-AZAUA-325U,CCCCU-AZAUA-AZAUA-325U,CCCCU-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-AZAUA-A
                                   HILYSIHT\NOPPCS
                                    SATBER.CCOY VOPMCE
                                   COMMON X114(230)+x114(200)+ANSG2S(230)+SARC2(203)
                                   COMMON CAPECIOOS .CAPECIOOS .SETAS.SETAC. **CCC. **NCAP. **LPMM. **NS2
                                 COMMON AUC1019+ISHARP+NOHIBE+VBHON+FRHZC100)+BBTAN2C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C1000+C10
                                  COMMON SIGMA+SBETA+XXM+ICPI+SARCOD(513)
                                   COMMON IDJ., XA, XB, XC, TANG, EP, YC, YR, JBIGS, XLBIGS, BIGS, BALS, DSS
                                    COMMON XSV(6) + CCC1 + CLE + ERC + YYY + XM + ITERA + SK SIO(6) + SX SIO(6) + YXS (6)
                                    DD44DN PS[Z,LP,SARC(613),SARCD(613),LPM+DE
                                    COMMON SEFANES13>+SEFAMES13>+IJ+LPK+XII(200)+XJJ(200)+XXX
                                    COMMON XROUND+AZAA+3233+C2CC
                                   2UADV (COC) 2LAGA (GOC) 2LAGA (GOC) 846 (GOC) 
                                  P4I =3.141592653
                                 12=1++2
                                 X3=X++3
                                 xs=SaRT(x)
                                  K4=X+KS
                                  XFREE2=XFREEC++2
                                 X - R - E 3 = X - R - E - C + + 3
                                  XFREES=SQRT(XFREED)
                                 X===E==xF=EEC+xF=EES
                                 X22=+2++2
                                 x23=.2**3
                                 £25=$231(.2)
                                  X2H= .2 . X2S
                                 x32=+3++2
                                 x33=+9++3
                                 x95=5271(.8)
                                 X34=X35+.3
D WE MUST CHECK TO SEE IF WE ARE SUIND TO DALDWATE THE TOP PART D OR THE BOTTOM PART. IF TOP WE TRANSFER TO 2ND HALF OF ROUTINE. DISTIZE = 3 IS USED FOR CALDULATIONS OF UPPER FOIL PROFILE.
                                 IF(IS112.E3.1) 30 TO 30
                                 IF (IS112-EG-3) GO TO 30
                                 I= (X._5..2) 30 TJ 15
                                 IF (X.ST..B) SC TO 25
                15 Y=A2A4+X+3235+X2+3203+X3
                                  YDX=A244+3238+2.**+5200+3.**(2
                                 CXCY)NATA=ATEE
                                 33 F3 46
                 20 Y=AAAA+(4./3.+x+6./3.+xH-4.+x2)+8333+x+CCCC+xS
                                 YJX=AAAA+(4./3.+8./3.+1.5+X5-9.+X)+3888+.5+CCCC/KS
                                 EETA=ATAN(Y)X)
                                 30 TO 50
                 25 Y=A9+35+Y+C5+K2+D3+K3
                                 YDX=83+2.+06+X+3.+D6+X2
                                 SETA=ATANETOX)
                                 30 TO 60
CITYLS 2ND HALF OF THE ROUTINE IS FOR CALCULATING THE UPPER HALF
```

```
30 IF (IS112.EQ.3) GD FD 70
   IF (XFREED-LE--2) 63 TO 35
IF (XFREED-LE--8) 63 TO 50
IF (XFREED-GT--8) 63 TO 65
70 CONFINUE
   IF (X-LE--2) SO TO 35
IF (X-LE-+5) GO TO 50
IF (X-ST--3) SO TO 53
35 R1=YFREED-42AAJ*XFREED-8288J*XFREE2-C2CCU*XFREE3
   I= (15112.EQ.3) R1=0.
I= (X.87..2) 30 T0 40
   Y=A2AAU+X+8288U+X2+0200U+X3+R1
   YD#=A2AAU+2.+8288J+(+3.+C2CCJ+X2
   IAC- (XCY)NATA=AIEE
   30 TO 50
+C Y2=4244J++2+8288J+X22+C2CCJ+X23+R1
   R2=Y2-AAAAU+(4./3.+.2+8./3.*X2-4.*X22)-8888U+.2-CCCCU+X2S
   1= (IS1I2.E3.3) R2=).
   IF(X-3T--8) 50 TO 45
   Y=AAAJ*(4./3.*x+8./3.*x+4.*x2)+3538U*X+CCCCJ*XS+R2
   YDX=AAAJJ*(4./3.+6./3.*1.5*(S-5.*()+3383J+.5*CCCJ/XS
   BET4=4TAN(YOX)-PAI
   33 10 56
¥5 Y3=A8J+99U+.8+C8U+X92+D6U+X93+R2
   R3=Y3-48U-38U++8-08J*X82-08J*X83
   IF (IS112.22.3) R3=3.
15 Y=A3U+38U+X+C8J+X2+33J+X3+33
   YDK=83J+2.*C8J*X+3.*33J*X2
   IAG-(XOY) PATE ATEC
SC R2#MFREEC-AAAAU+(4./3.+XFREEC+9./3.+XFREEH+4.+XFREES)-8866U+XFREEC
  1 -CCCCJ+XFREES
   IF (IS112.EQ.3) R2=0.
   IF (x+3T++8) 30 TO 45
   Y=4444J*(4./3.*K+5./3.*X+-4.*X2)+3533J*X+CCCCJ*KS+R2
   YCX=AAAAU+(4./3.+8./3.*1.5*XS-8.*X)+8888U+.5*CCCCU/XS
   IAC+ (XCY) / AT A= ATE
   30 TO 50
55 R3=YFREEC-ABU-89J*XFREEC-C8J*XFREE2-D8J*XFREE3
   I = (IS112.EQ.3) R3=0.
   30 TO 46
SO RETURN
   ENO
```

. .

```
CYC. XC. ECY. ECX CX SYTTLOSGUE
  COMMON/UPPER/AZAAJ+3288U+C2CCJ+AAAAJ+868EJ+CCCCJ,AASJ+88J+C8U+D6U
  x<=2x
  x<2=x<**2
  X<3=X<++3
  x < S = 52 < T ( x < )
  XKH=XK+XKS
  12=5
  IF (CX.LE..2) GO TO 3
I= (CX.LE..3) GO TO 4
  I= (CX+ST++5) GO TO 5
3 F1=A2AAU*XK+B2SSU*XK2+C2CCU*XK3
  F2#4244J+2**B2BBJ*K5+3**C2CCJ*X52
  =3=XK-CY
  Fx<=F1+(F3/F2-CY)
  21==2
  02=(01+=3*(2.+32BBU+3.+C2CCU*x<))/01++2
  DFX<=01+02
  DIV=FXK/DFXK
  X1=KK-DIV
  IP=IP+1
  Z=ASS(DIV/x<)
  I=((Z.LE..030001).SR.(IP.EG.20)) 30 TO 6
  30 10 3
# F1#4A4AU*(4./3.#X<+3./3.*X<1-4.*X<2)+8888J*X<+CCCCJ*X<S
  F2=A4AAJ+(4./3.+8./3.*1.5*x(S-6.*XK)+BBBBJ+CCCCJ*.5/XKS
  =3=x4-0x
  FXK=F1+(F3/F2-CY)
  21==2
  D2#(D1-F3*(AAAAJ*(8./3.*1.5*.5/XKS-3.)-CCCCJ*.5*.5/XKH))/D1**2
  J=x<=31+02
  DIVEFKK/DFKK
  1P=1P+1
  2=435(319/(4)
  IF((2.LE..030001).OR.(IP.E0.20)) 30 TO 6
  33 FD 4
E =1=48U+68U+x<+C8U+x<2+36U+x<3
  F2=53J+2.+03U+7<+3.+03U+X<2
  =3=<K-CX
  FXK=F1+(F3/F2-CY)
  31==2
  22=(D1-F3+(2.+C8U+5.+39U+xK))/31++2
  3FXK=31+82
  DIVER CADEXK
  XK=: K-DIV
  19=19+1
  Z=ASS(DIV/KK)
  I=((Z.LE..303001).33.([P.E3.20)) 30 TO 5
  30 TO 5
E XC3=X(
IF (CX+LE++2) YC8=A244U+X(+3233J+X(2+C2CCU+XK3
I=(CX+LE++3) YC3=AAAAJ+(4+/3,*X<+8+/3+*X++4+*X<2)+388J*XK
( +CCCCJ+X<S
 if (CX+ST++8) YCB=A9J+B8J+X<+C8J+XK2+D8U+XK3
  RETURY
 CVE
```

```
SUBROUTINE FOR(T+F+4_+XH+1S112)
  UB C. UBO . UBB. LBA. LCCCC. UBBB. LAAAA. LCCCC. UBBEE. UAASA. FRALVOPPCC
  SATERACCON VCF CC
  COMMON (IF4(206)+KIF4(206)+ANS528(270)+SARC2(200)
  COMMON CAVX(100) +CAVY(100) +BETAB +BETAC +XCCC +NCAV + LPMM +NS2
  COMMON AUC100) +15442 + NCH3Y + 33T4NC100 + 36TAN2C100) +35TAN2C100)
  COMMON FLAPANADELTAADGAPALFA1.GAMMA
  COMMON SIGMA, SEETA, KK4. ICPI, SARCOD (513)
  COMMON IDUL.XA.XB.XC.TANG.EP.YC.YR.JBIGS.XLPIJS.BIGS.SMALS.DSS
COMMON XSY(5).COC1.3.E.ERG.YYY.XM.IIERA.SXSIO(6).SXSIOD(6).XXS(6)
  30.440N PSIZ.L2.5ARC(513).5ARC)(513).24.0E
  XXX+(200)+XJJ(200)+XJJ+L+C-1000+XJJ(200)+XJZ
  TJ44JW XRJJWD+4244+3233+0200
  COMMON AAAA, BEBB, CCCC, A5, BB, CB, BS, TBAUS(100), dGAUS(100), NGAUS
  LICONF=1
  x==(y+-xL)+T+-5+(x++x_)+-5
  5x2=S44T(x2)
  x>2=x>++c
  IF(XP+GE++8) GC TO 1
IF(XP+LE++2+AND+IICONT+EG+1) GC TO +
  IF(XP.LE..2) 30 TO 3
  21=(4./3.+4. +Sy 2-4.+(2) +AAAA
  22=9633
  P3=+5+0000/8xP
  I= (IS112-23-1) =1=(4./3.+4.+5x3-4.+x3)+AAAA4
 IF (15112.53.1) P2=33350
IF (15112.53.1) P3=-5-0000U/SXP
  50 TO 2
3 P1=-.5+53RF(2.*xR3J43)/5x2+4244
 22=3233+SY2+1+5
  -3=2.*02C0*xP
  I= (IS112.51.1) P1=-.5+SQRT(2.+(RDUND)/GXP+424AJ
I= (IS112.52.1) P2=3235U+SXP+1.5
I= (IS112.52.1) P3=2.+0200U+XP
  30 TO 2
+ CONFINGE
 71=4244
  72=2.+3283+XP
  23=3 + 0200 + < 22
  IF (IS112.EQ.1) P1=4244U
  I= (18112.52.1) P2=2.+3233J+XP
  I= (IS112.E3.1) P3=3.+0200J*XP2
  30 10 2
1 21=35
  92=2.*C8*x3
  23=3++3=+(22
  IF (IS112.EQ.1) P1=33J
  IF (IS112.59.1) P2=2.+08J+XP
  I= (IS1I2.EG.1) P3#3.+28U+XP2
2 24=21+22+2
  242=P4++2
  25=1+242
  5 > 5 = 5 1 3 7 ( > 5 )
  F=(XH-XL)+5P5++5
  RETURN
  END
```

```
SUBROUTINE MOSEC(A+3+ER1+ER2+X+J+XLPA+IS112)
   J≈a
   x 1 = 4
   x 2 = 3
 4 J=J+1
   IF(J.3E.800) SO TO 8
   CAL_ FARC(PFX1+XLPA+X1+IS1I2)
CALL FARC(PFX2+XLPA+X2+IS1I2)
   x3=x1+(x2-x1)+PFx1/(PFx1+>F(2)
   CALL FARC(PFX3.XLPA.X3.IS112)
IF(PFK3)1.2.3
 1 42=43
   x1=x1
   1=(4-5)10+11+11
10 Y=x3-ER1
IF(Y._E.O.) Y=0.
30 TO 12
11 Y=x3+ER1
12 CALL FARC(PTY+X_PA+/+[S1[2)
IF(FFY) 5+2+2
 3 x1=x3
   X2=X2
   IF(4-5) 20+20+21
20 Z=X3+ER1
   33 TO 22
21 Z=x3-ER1
22 CALL FARC(PFZ+xLPA+Z+IS1I2)
   I=(2FZ)2+2+5
 5 50 TO 4
 2 PP= A3S(PFX3)
   I=(PP-ER2) 5,5,4
 6 x=x3
   33 13 7
 8 #RITE(6.9) J
 (EI+=UHS+X1)TAPFCP @
   3 T O =
 7 RETURN
   CVE
   FUNCTION AITKENEXX+ (f+x+N)
   DIMENSION XX(1), YY(1), ZZ(21)
I= (N)1,1.2
 1 AITKEN=YY(1)
 RETURN
2 IF (NeST-23) N=20
   M=N+1
   00 3 4=1.4
 3 22(K)=YY(K)
   33 4 I=1.4
   00 4 J=1.8
 4 2Z(J+1)=ZZ(I)+(x-xx(I))+(ZZ(J+1)-ZZ(I))/(xx(J+1)-xx(I))
   AITKEN=ZZ(N+1)
   RETURY
   EVO
```

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```
SUBSTITUTE DETERM (A+N+D)
DETERM REVISED 02-26-73
REAL M
       DIMENSION A (50.50) . SAVEA(50.50)
       IF (V .E3. 1)60 TO 45
       C = 1.
       V = V
  VM.1 = L € OC

VM.1 = I € CC

(L.1)A = (L.1)A3VAE €
       K = 1
      30 TJ 13
 30 TO 17
      I = I + 1

IF (1 *NE* NN)30 TO 16

IF (L *E2* K)30 TO 29
       ) = (
      ROW INTERCHANGE
      30 TO 23
      J = J + 1
 23 SAVEKU = SAVEA(K+U)
      SAVEA(K,U) = SAVEA(L,U)
SAVEA(L,U) = SAVEA(L,U)
      IF (J .NE. NN)50 TO 22
C = -C
 29 Î = < + 1
      30 10 31
 36 I = I + 1
       BLFITFCC
      IF (SAVEA(K+K) +ED+ D+) 30 TO 49

4 = SAVEA(I+K) / SAVEA(K+K)
                                                                                              62-20-73
      SAVEA(I,<) = 0.

J = < + 1

30 TJ 36

J = J + 1
      SAVEA(I.J) = SAVEA(I.J) - 4 * SAVEA(K.J)
      IF (J .NE. NV)30 TO 35
IF (I .NE. NV)30 TO 30
      IF (< .NE. (NN-1))50 TO 12
      0 = 1.
33 45 L = 1.444
      J = I
      3 = 3 + SAVEA(I+J)
      IF (43S(0) -_T. 1.5-35) 30 T0 48
      BLVITVCC
      3 = 3 + 3
      RETURN
    3 = 4(1+1)
      RETURN
     ) = 0.
#RITE (6.51)
      RETURN
   FORMATC//5x+TERROR MESSAGE FROM DEFERM+T/
1 5x+TMATRIX IS SINGULAR+ DETERMINANT SET = 0+T //)
Ιċ
```

```
SJERDJEIRE BRBETA(XC+RBETA+18112)
THIS SIVES BETACKERSID).
      COMMON XITM(200) + X1TV(200) + ANSG2S(230) + SARC2(200)
       SZNAMAN CAYX(100) CAYY(100) SEFAB BEFAC COCONCAY LPMM NS2
       COMMON AU(190) + ISHAR > + VCHBY + 8 3 TAN(100) + 8 ETAN2(100) + 3 ETAN2(100)
       COMMON FLAPAN. DELTA. DAP. ALFAI. GAMMA
COMMON SIGHA. SBETA. KKH. LCPI, SARCOD (513)
      COMMON IDJL.XA,XB.XC.TANG.EP.YC.YR.JBIGS.XLBI3S.BIGS.SMALS.OSS
COMMON XSV(5).CCC1.J.E.ERC.YYY.(M.IFERA.SXSIO(6).SXSIOO(6).XXS(6)
       COMMON PSIZ.LP.SARC(513).SARCO(513).LPM.DE
       COMMON BETAY(513), BETAM(513), IJ. PK. XII(20C), XJJ(200), XJX
       COSO-EESE-AASA-GUUCAX NOMMCO
       CDMNON 4AAA+8888+CCCC2+A8+88,C8+C8+T3AJS(100)+454JS(100)+NGAUS
       ER1=5.E-3
       ER2=5.E-3
       I=(IS112.E3.1) 30 TJ 20
: IS112=0 FOR S1.
: 1 FOR S2.
        SHAATLPH-1
       SMA_S=SARC(LF)
       I*(_2.23._24) 32 TO 13
       DSS=SARC(L2)+SARC(L2+1)
       X_PA=XX
       33 TO 21
   20 SHALS=SAKC2(L3)
       IF(_P+EQ+1)30 TO 113
       X_24=XX
       JSS=SARC2(_2)-SARC2(_2-1)
   21 CONTINUE
       X1 A= X-3A
     4 X15=X14+.0C1
       CAL_ =ARC(=4R+X_24+x13+IS1I2)
       IF(FAR-LT-0-) GC TO 3
       X14=X13
       33 73 4
     3 CALL MOSEC(X1A+X15+ER1+ER2+XX+JII+X_PA+IS1I2)
30 f0 ii
   10 XX=6.
       30 F3 11
  113 XX=XCCC
   II CALL SHAPE(XX+Y+R3ET4+IS1I2)
RETURN
       END
```

.,

```
SJERDJTINE FARC(FAR+X_PA+X13+IS112)
  COMMON XITH(200).xITN(200).ANSG2S(200).SARC2(200)
  COMMON CAVECTOD +CA/FCIDO) +BETAB+BEFAC+XCCC+NDA/+LPMM+NR2
  COMMON AU(103)+ISAARP+NCHBY+BBTAN(100)+BBTAN2(100)+BETAN2(100)
COMMON FLAPAN+DELTA+2SAR+ALFA1+SAR44
COMMON SISHA+SBETA+KK4+ICPI+SARCOO(513)
  COMMON IDULAXAAXBAXCATANGAEPAYCAYRAJBIGSAXLBIGSABIGSASMALSACSS
  COPHON XSV(5),CCC1.CLE,ERC.FYY.KM.IFERA.SX510(5).SX5100(6).XX(6)
  COMMON PSIZ+LP+SARC(513)+SARCO(513)+LPM+DE
  DDMMON BETAN(513)+BETAM(513)+IJ+LPK+XII(203)+KJJ(200)+KDX
  COMMON XROUND.AZAA.3288.C2CC
  COMMON ARAA, B358,0000, A8,88,09,08,T3AUS(100), #GAUS(100), NGAUS
IF(XLPA,EG,X13) GO TO 1
  CALL ARCLEN(XSS-XLPA-x16-15112)
30 FG 2
1 xss=0.
2 CONTINUE
  FAR=DSS-XSS
  RETURN
  EVD
```

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LISTING OF PCASLE 6.0

CCCC+860; R+AAA4,3339+CCCC READ(5.560) A8+88+08+06

```
PRUGRAM PRASLECINPUT.DUTPUT.TAPE5=INPUT.TAPE6=OUTPUT.TAPE7.TAPE1)
   *SUCTED ASSESS ENTERTY CAVITATING CASCADE CALCULATIONS.
  S/LT/1978 PROGRAMMED BY D. FURUYA.
D----PROGRAM REVISED FOR FIXED CAVITY LENGTH VERSION ON 9/15/78.
DPEN BAKE MODEL (8/15/1979)
      JIMENSION YBE(7) + XZ(7) + BETA YOU 513) + BETA MO(513) + BETA J2(108)
      JIMENSION SXSI(7)+X4x(513)+2P(513)
      DIMENSION =_(200),=0(200),002(101),4xx2(201),=02(100),F02(100)
      COMMON/FOILEND/XXDD. YYDD
       COMMON /CVTYL/CAVLEN-31352
      CBBFRY & CBBFRY / VACEBRA / NOFFCS
       COMMON/DELTAB/DELTE7.7)
       HILYSIFTLYOPPES
      CD44DN YCCC+SBETA2
      COMMON XIT*(200) + XITY(200) + 4NSG2S(200) + SARC2(200)
      COMMON CAVXCIOO>+CAVYCIOO>+BETAB+BETAC+XCCC+NCAV+LPMM+NS2
      COMMON AUCIOQ)+IFARP+NCHEY+BENC19G)+BENCCCCC)+COMON COMMON FLAPAN+DELTA+JGAP+ALFA1+BA444
       VOPPES
                    SSETA+ ( < 4+ ICPI+SARCOD(513)
       COMMON IDUL:XA;X5;XC;TANG;EP;YC;YR;JBIGS;XLBIGS;BIGS;SMALS;DSS
                           CLE, ERC, YYY, KM, ITERA, SXSID(7), SXSIDD(7), YXS(7)
      COMMON XSY(7).
      COMMON PSIZ.LP.SARC(513).SARCO(513).LPM.DE
      334434 BETAY (513) + BETAM (513) + [J+L2K+X11(200) + KJJ (200) + XJX
      C34404 XR3JN3+A244+3233+3233
COMMON AAAAABBBACCCCCAASABACBACBACBACCCCOO, AGAUS(100), AGAUS(100), NGAUS
C BETAN----FOR ARC 1 FOR RESULAR ENTERRAL.
DETAND IS FOR INTERPOLATED VERSION OF BETAN .
DETAND FOR EQUALLY SPACED INCREMENT FOR ARC 2.
C BETANS FOR CHEBYCHEV- GAUSS VERSION OF BETANS.
      PAI=3-141592653
      READ (5+795) NGAUS
      V3AJS1=VGAJS+1
      SIZLACESSERVE
      1+SYNV=SZLACF
      READ(5.560) (TSAUS([).I=NGAUS2.NGAUS)
      READ(5,560) (#GAUS(1), I=NGAJS2, NGAUS)
      33 56 I3=1.4NAS
      TGAUS([2)=-TGAUS(VG1JS1-[2)
   26 #GAJS(IG)=#GAJS(NGAJS1-IQ)
      4RIFE(5+551) (T3AJS(1)+1=N9AJS2+N3AJS)
       HRITE(5.552) (WGAUS(I).I=NGAUS2.NGAUS)
  550 FORMAFC4F20-10)
  561 FGRMAT(1X++T(1)=++10(F10+8+1X))
      PXX (065.6) CA3F
      33 583 135_74=1.7
  589 READ (5.590) (DELT(IDELTA.I).I=1.7)
  552 FORMARCIX, #4(I) = #, 10(F10.8,1X))
                                                       DOYY . DOXX . HT 3065, 50 DAER
      READ(5,560) TH
```

```
READ(5.563) XROUND.4244.8233.0200
      READ(5.560) AAAAU.BBBBJ.CCCCU
      READ (5.550) A8J.38J.28U.03J
      READ (5.550) A2AAU.3233U.02001
      READ(5.795)
                            YEHEY
      READ(5.1321) SBETA .SBETA2.SF4.BETAB.BETAC
      READ(5,551) LPMS+LP(S+LPM2+IFLAG+IREAD+ISHARP READ(5+201) NITER+MSIDP+MAXIT+NHK
      READ(5+202) ALFA1S+3A44AS+SJLIS+
READ(5+229) DE+J6+0=
I DAVLEM IS A CAMITY LENGTH SPECIFIED.
      33 592 IDELTA=1.7
  592 HRITE (5.591) (DE_T([DE_TA,[],[=1.7)
      WRITE(6,6553)
5553 FORMAT(1H1)
      READIS.SSSS) ESPACE
5556 FORMAT(F13.5)
      ARITE(5.6557) ESPACE
 5567 FORMAT(1x+///+1x+*ESPACE=*+=5.2+///)
      #RITE (6.5590) TH.XK4
      ARITE(5.5651) BETAB. BETAC
      #RITE(6.553) R.AAAA.33339.CCCC
      #RIFE(6.555) A8.83.03.03
      #RITE(6.567) XROUND.4244.8233.0200
      #RITE(6.524) A8U.38J.C3U.08J
      #RITE(6.525) A2AAJ.3233J.C2CCJ
      HRITE(6.1229) LPMS._PKS.SETA.IREAD.NCHEY
      #RITE(5.1324) DE.JG.JF.SF4
      ARIFE(5.1521) S3ET42
  523 FDR4AT(20x++AAAAU=++F1C+6+2x++8383U=++F1C+6+2x++CCCCU=++F1D+6)
  524 FJR4Aff20K++A5J=++F1J+5+2K++B3J=++F1C+6+2K++C5J=++F1Q+6+2K++D5U=++
     1 = 10 -5)
  525 FORMAT(20x,+A2A4U=+,F18.6,2x,+3233U=+,F10.6,2x+32CCU=+,F10.6)
  590 FORMAT (SF10.8)
  191 FORMAT (10x++3E_TA(1+3)=++7(F10+8+2())
 SERO FORMAT (20x, *THICKNESS OF PLAND CONVEX FOIL = *, F10.5, 10x, *XX4=*,
     1-10-5)
  555 FJRMAT620K++R=++F5+2g2K++A444=++F10+642K++B3B3=++F10+642K++CCCC=++
     X#10+63
  556 FORMAF(20x+*A8=*+F10+5+2X+*38=*+F10+6+2X+*C8=*+F10+5+2X+*D8=*+F10+
  557 FJR4AF(20x, **XRUJNJ=*, F10.6, 2x, **A2AA=*, F10.6, 2x, **B2B3=*, **10.6, 2x, **C
     (200=++f10+5)
  795 FORMAT(8110)
2 44AA+333B+CCCCARE CONSTANTS FOR 2-FERM CAMBER+ X 440 SERT(X)
   -----CALCULATED FROMANOTHER PROGRAM CALLED +CAMBER
 AS. 38.C8 AND DE ARE COEFFICIENTS FOR POLYMONIALS FOR X SREATER THAN .8.
 CLOD AND CLOOK ARE NOW DUMMY.
3 SF4 IS USED FOR DETERMINING WHETHER TO CALCULATE BETA.
1321 FORMAT(5E14.7)
C IFLAGE: NEEDS DATA CARDS FOR SKSICI) + I=1+5+ IREAD MAY BE SET TO 5+
DIF IFLAGED + DATA WILL BE READ EITHER FROM
DATA CARD+ IF IREAD=5
TABLE + IF IREAD=1+
 SS1 FORMATCICES)
  (EIA)TAPRC 165
  232 FJR4AF (4E14.7)
```

```
O DE+DG+DF ARE THE INCREMENTS FOR DERIVATIVES IN EXFNEN-
  DB=1.6-3 & OF=1.6-5 ARE USED BEFORE.
    229 FORMAT(3E14-7)
  111e TARAINDe XCe To 412e TATACANC ex Cale To 4 Cake 4 Cak
           <2x++NCHBY=++13)
  5551 FCRMAT(20x, *8ETAB AND BETAC AS FIRST GUES6=++F10.5.2x+F10.5)
  1324 F344F610X+3H3E=+E14+7+2X+3H3G=+E14+7+3HDF=+E14+7+2X+4H8F4=+E14+7)
  1521 FORMATC10x++SBETA2=++E14+7)
              SBETA2=SBETA2*PAI/183.
              BETAB=SETA3+PAI/180.
              BETAC=BETAC+PAI/130.
    244=L2M2=VS2
              L244=L2M2
              452=L342
              LPM41=LPM4+1
              ARITE(S+1489) LPM2+ISHARP
  1439 FORMAT(10x++LPM2=+,13,2x++134ARP=++E14+7)
2 [SHARPED FOR SHARP LOE.
                    1 FOR RUUNDED LOES
              SBETA=SBETA+PAI/180.
              33 999 IUC_=1+NITER
   FFF4 IS PROVIDED FROM DAFNEW. BUT IF THE LOOP DOES NOT SO THROUTH IT. FFF4 DF PRESET /ALJE HUST BE USED.
              FFF4=3.
              ALFAID=ALFAIS
              SAFFAS=SAFFAS
              SOLID=SOLIS
              C45 CT CG (1.E3.>FV) FI
              IF(NH<.EQ.2) 30 TO 241
              SULID=SULIS+0.1+F_DAT(IJK_-1)
              30 TO 243
    241 3444AD=SA44AS+2.#FLJAT(IJKL-1)
              33 FJ 243
    240 ALFAID=ALFAIS-2.+FLJAT(IJKL-1)
    243 CONTINUE
              X4=XX4
              ALFA1=ALF413+3AI/183+
              DGAP=1./SOLID
              34444=3444D+PAI/13J.
              DELFA=ALFA1+GA44A
              FLAPANES.
               WRITE(5+655) ALFAID+GAMMAD+SOLID
    556 FORMAT(1x-15HINCIDENCE ANGLE=+E14-7+1x-5HGAMMA=+E14-7+1x-9HSOLIDIT
            XY=+214+73
              WRITE(5+653) FLAPAN
    553 FORMAT(5x+11HFLAP ANGLE=+E14+7)
              312--=2.E-4
              STOLS=5.E-4
              ERC=1.E-2
              CLE=1.E-4
               HRITE(5.511) CAVLEY
     511 FORMATCIBX . * CAVITY _ENGTH= + . E14 . 7)
S SPECIFY HYDROFDILES CHARACTERISTICS AND SEP. POINTS.
              KC=0.
               YC=0.
              X3=û•
              X4=1.
              ** Q3=1 - C6000
              YY33=43U+33J+C9J+33J
              ARITECS+502) XA+XB+XC+YC+XXDD+YYDD
```

```
x. POINT(XC,YC)=(.E14.7.1H..E14.7.1H)/+ XXDD=+.F10.5.2X..YYDD=+.
     7 -13.5)
O START ITERATIVE PROCEDURE.
THE THE TENENT IS INDEX FOR NUMBER OF ITERATIONS.
      ITERA=1
      LF(IFLAG.ER.O) LTERA=2
      81GS=0.
      XHIGH=0.
      x_34=0.
      IS112=0
      XINCRE=XA/50.
      00 248 IINC=1.50
      X_JS=K4IG4
      xHIGH=XLO++XINCRT
      CALL ARCLEN(SexLOdexHISHeIS112)
  248 3195=3155+5
    --FIND BIGS2--
          FIRST DALL SHARE TO FIND A CORRESPONDING TO CAVLEN.
      XCCC=CAVLEY
      XFREES=CAVLEN
      CALL SHAPE(CAVLEN.Y.BETA.3)
      YFREED=Y
      Y000 = Y
      CALL ARCS2(BISS2.CAVLEN.Y)
      43156(5,504) 3135,81332
  504 FORMAT(10x+5HBIGS=+114+7+5x++BIGS2=++E14+7)
      STU_=1.E-5
      LPM=LPMS
      _P<=_2<S
      _241=_284-1
      _P45=LP4-3
I IDPLIS USED FOR CONTROLLING PROGRAMS O FOR ITER. 1 FOR THE REST.
I FIND XSIB.XSIC.XSIF.A.ALFA2 BY JSING NEWTON.S METHOD.
2 S(SI(1)=xSI3
: SxSI(2)=xSIC
2 3451(3)=xSIF
 SCSICADEA WHICH IS THE COEFFT. OF MAPPING FON-
C SKSI(5)=ALF2
 $4$145)=$134A
C $4SI(7)=E>PACE (RATIO OF SPACE OF BLADES AT JPSTREAM AND DDWNSTREAM)
                                                                                C
      IF(IJ(_.GE.2) SO TO 530
IF(IFLAG.EQ.D) GO TO 779
D INATIAL GUESS FOR SXSI(I) IS -----
     READ(5+763) SKSI(1)+SKSI(2)+SKSI(3)+SKSI(4)+SKSI(5)+SKSI(6)
                  •SXSI(7)
     33 FO 150
  779 READ (IREAD+620) SXSI(1)+SXSI(2)+SXSI(3)+SXSI(4)+SXSI(5)+SXSI(6)
                 .SXSI(7)
  520 FORMAT(7510.7)
  529 33 521 IC=1.LPM
  $21 READ((READ+522) SARD((C)+3EFAN((C)
522 FORMAT(2E14+7)
      30 1521 IC=1+_2441
 1621 READ (IREAD. 622) SARCE(IC). BETAN2(IC)
      I=(IF_A3.52.0) 30 TO 480
      50 TO 481
  430 30 482 IBT=1+LP41
  432 BETA 4 (18T) = .5 + (3ETA 4 (18T) + 3ETA 4 (18T+1))
```

```
431 CONTINUE
  150 1091=3
       ARITE(5+102) ITERA
  CITY - CITY FILL FOR CONTRACT SCI
       33 850 IRP=1.7
                                                                                              С
  (SEI) IZX Z= (SPI) CIZXZ OEE
       IF (ITERA.JE.2) STOLESTOLS
       IFCITERA-EG-MSTOP) STOLESTOLL
       CALL DXFNEHCSXSI+STDL+MAXIT+ITN+D3+DF+FFF4)
  SEC CONTINUE
       00 537 101=1.7
       XSN(131)=SXSI(131)
  537 RRITE(5+535) [01+5X31(IQ1)
  536 FORMAT(10x+5H$X$I(+I1+2H)=+E14+7)
       CSPACE=(1.+SXSI(1))/=LDAT(_P()
       HCSPAC=C.5+CSPACE
       FSPACE=CSPACE/FLDAT(LPM-LPK)
       MFSPAT=G.5+FSPATE
       ABET=-1.+SSPACE+FLDAT(LPK-1)
       1291=1
C ICPI=0 FOR FINDING SXSI(I). I.E., SXSI(I)=YXS(I)≥ ICPI=1 FOR THE REST. CALCULATION OF PRESSURE DISTRIBUTION 10°1.
       IF(ITERA-EQ-1) SO TO 36
       33 35 IS=1._P4
   (61) MATSE=(BI) CMATSE CC
       00 37 IS=1.LPM1
   57 35T44)(18)=35T44(18)
       DC 355 IE=1,LPM41
  355 3ET402(18) = BETAN2(18)
   35 CONTINUE
       JJ2=CJS(A_FA1+GA444)/338(SXSI(5)+3A44A)/SXSI(7)
                                                                                              С
       1155=115++5
       35 25 LG=1.LPM
       . > = . 3
C FIND CP(XSIP) NEXT.

C----- FOR THE FIRST JETTED ARC PORTION S1-----

C P IS BASED ON UI AND P1.

C P IS NEAR THE T.E.

C P IS NEAR THE L.E.
       I=(LP.EQ.1) SO TO 521
       1 - C- 2 - E3 - 2 4 9 GO FO 52
       Q2=EXP(XITY(LP))
C XITY(I) IS CALCULATED IN DESIGN OF DXENEW FOR F(4).
       92=32++2
       C=(_P)=1.-JJ22+22
       $3 F3 522
   52 CP(LP) =- SXSI(6)
       33 73 522
  521 CP(LP)=1.-UU22
  522 CONFINUE
25 CONFINUE
```

```
D-----OP FOR THE SECOND ARD SE-----
                  VUMBER OF CONTROL POINTS ON S2 IS FIXED IN SUBROUTINE OFSIM5. I.E...

TALF OF THE POINT USED FOR BETA ANSGES IN COMMON = G2.

DO SED NCP = 1.E.PMM1
                  IF(NCP.EQ.1) GO TO 581
IF (NCP.EQ.1P441) GO TO 682
                   22 = EXP(AVSG2S(NCP))
                   32 = 32 * * 2
                   C22(NC2) = 1.-22+JJ22
                   30 TO 680
      531 072(N07)=-SXSI(5)
      30 TO 680
332 CP2(NCP) = 1.-UJ22
      SUPITIVES DEE
A=4=A3S(F==4)
                   I=(AF4.GE.S=4) 50 T) 1135
                  30 TO 1134
  1135 #RITE(5+1135)
1136 FORMAT(5X++F(4) IS TOO LARGE TO CALCULATE BETA+)
                  STOP
C FINC XXX(XSIP) FIRST.
1154 CONFINUE
                  13132=0
-----FIRST BETA FOR ARC 1-----
                  03 100 __2=1._PM
L2=LPM-LL2+1
                  CALL BESETACXYX+BETA+IS152)
                   BETANCUP)=BETA
                  IFCITERA - LE-MSTOP1) 30 TO 100
HRIFE(5+101) LP+S4R2(LP)+KKK(LP)+CP(LP)+BETAN(LP)
      198 CONTINUE
      131 FORMAFCIX+2HI=+13+1X+5HSARC=+E14+7+1X+4HXXX=+E14+7+1X+3HCP=+E14+7+
              41x+5435TAN=+E14+7)
SARCZ HAS BEEN CALCULATED CON EN SHEET CONTROL OF SHEET C
                                       STORED IN COMMON AREA.
                  IS1S2 = 1
                  33 429 L2=1+69441
L2=LL2
                  CALL BBBETA(XYX+BETA+15152)
IF(_P+IG+1) BETACRBITA
```

```
XXX5(-5) = XXX
      BETANZCLP) = BETA
  IF(ITERA.LE.MSTOP1) 30 TO 329
#RIFE(5.239) _P.SARCZ(_P).x(X2(_P).CP2(LP).3ETAN2(LP)
239 FORMAT(9X.xI=+.I3.1X.*SARCZ=+.E14.7.1X.*XXXZ=+.
     *E14+7+1X+*CP2=++E14+7+1X+*3ETAY2=++E14+7)
  BUNITHCO ESE
2 FIND LIFT AND DRAG.
D-----FIRST 2L AND 00 FOR S1 PART.
     (AT_3C) PIZ = CIZL
(AT_3C) ZOC = CCCL
      CCCL+(+)12X2 = E>L
      JX82 = JX3**2
      20 105 174 = 1, P4
LF(IT4.ST._PK) 30 TO 106
      xPS = -1.+CSPACE+FUJAT(IT(-1)
      30 TO- 108
  135 xRS = XBET+FSPACE+FLDAT(ITK+LPK)
  ELVITACO ECI
      CIEL+(4)12XE-SAX = AXL
      JXA2 = JX4 ** 2
      (SEXU+SAXU)\CCOU = GKX9
      343x = 3643+PXX2+X35/24I
      COTIDIATEDECE = COSCETANCITO)
                 = SINCAETANCITO)
      SIBETI
      SSIQN = FREYCHINATING = XCIEC

FRIENCE FA CETALLULAD SI IS

FRIENCE FA CETALLULAD SI IS
      FL(IT() = -XLP1+CDSET1
      FOCITO = (LP1+SI3ET)
  135 CONFINE
C----CL AND CD FOR S2 PART.
      V$21=V$2+1
      VS2A=VS2-1
      3472 = (S(SI(3)+SXSI(2))/NS2
33 533 IT< = 1. NS2I
      x=s2 = SxSI(2)+SA^{2}2*(ITK-1)
      C12L+(4)12x2-225x = 4>L
      UXA2 = UXA++2
      (SEXL+SAXL)/CCOU = CXXC
      JEDX = JGAP+PXXP+XR$2/PAI
      CONTINENATED SCE-= STEECE
      CONTINENTAL STREET
      DS2DX = EXP(-ANSG2S(HTK))+DJ0X/JJ22
      32 IS ALREADY CAMOULATED AT DESIGN AS
      ANSSESCI) . STORED IN COMMON AREA.
      x_22 = D323x+C22(If()
      =_2(IT() =-XLR2+C035T2
      =32(11() = X=22.513E12
```

```
353 CONFINUE
             SPACE = CSPACE
               :LIFT = 0.5*CSP4CE*FL(2)+3.5*FSPACE*FL(LPM1)
             CIRAG = 0.5+CSPACE+FD(2)+0.5+FSPACE+FD(LPM1)
             33 111 IUA = 2.2943.2
             IF(IUA.GE.LPK) SPACE = FSPACE
               :_IFF = :_[FT+5PASE*(F_([JA)+4.+F_([UA+1)+F_([JA+2))/3.
    111 CORAG = CORAG+SPADE+(FO(IJA)+4.+FO(IJA+1)+FO(IJA+2))/3.
             321 IUA = 1+NS2A+2
               LIFT = CLIFT+G4P2+(FL2(IJ4)+4.+FL2(IJA+1)+FL2(IJA+2))/3.
    321 CDRAG = CDRAG+64P2+(FD2(IUA)+4.+FD2(IUA+1)+FD2(IUA+2))/3.
        --- ADD THE FORCES ON CAVITY PORTLONS.
             SUBROUTINE XCYC CALCULATES
         THE POINT ON THE UPPER BLADE PORTION CORRESP. TO THE CAVITY END POINT.
             CKASKOCO
             CYAFYCCC
            CAL. XCYC(XCCC3,YCCC3,CXA,CYA)
CLIFT = CLIFT+SXSI(6)+XCCC3
CCR46 = CCR46-SXSI(6)+XCCC3
I----XOCO AND YOOD ARE THE END POINTS OF CAVITY. CALCULATED IN
           YTIVAC SHITLESELE
            STORED IN COMMON.
2 FEND BINF IN 2-1.
             J2J1=335(A_FA1+3A444)/335(5(5)+3444A)/$X$I(7)
             DOWN=COS(ALFA1+GAMMA)+COS(SXSI(5)+GAMMA)
             31 4 = 3 . 5 + SI V (AL = A1 + SX SI (5) + 2 . + GA MMA) / DOWN
             SINFEATANCI./BINF)
             ALMESS-PAISINF-SARRA
I DISTAR AND ALSTAR ARE BASED ON FELDCIFY AT JESTREAM INFINITY IN (K.T).
             COSTAR=CORAG
             CLSTAR = CLIFT
             UINF=0.5*SGRT(1.+J2J1**2+2.*U2U1*COS(ALFA1-SXSI(5)))
             FIVF=2.+D3AP+SIV(ALFA1-SXSI(5))/(JIVF+C3S(SXSI(5)+GAMMA))
             CLINF=CLSTAR+COS(AINF)+CDSTAR+SIN(AINF)
            CDIVF=CLSFAR+SIV(AIN+)+CDSFAR+CDS(A[N+)
CLIN==CLIN=/UIN+++2
CDIVF=CDIV=/UIN+++2
             ARITE(5+117) CLINF+CDINF
    117 FORMAT(1x+34HCLINF OR COINF=FORCE/1/2RO+UINF++2+5x+5HCLINF=+E14+7+
           X14+5400IN==+E14+7)
            #RITE(6.118) FINE
    119 FORMARCIX. SAMFINE IS DETAINED FROM ADMENTUM EDN. 54FINE E. 14.7)
             #RITE(5.221)
    221 FORMAT(1X,48H---COLL $ CODD ARE BASED ON U1 IN ALFA1 DIRE.---)
COLL=CLSTAR+CDS(ALFA1)-COSTAR+SIN(ALFA1)
             CCDD=CLSTAR+SIN(ALFA1)+CDSTAR+COS(A_FA1)
             ALDD=CCLL/CCD3
             4717E(6+131) 0000+001__+4L00
    131 FORMARCIX+54CCOO=+E1++7+1X+54CC__=+E14+7+1X+44L/O=+E14+7)
             457321=45732-1
            IFILITERA ...E.MSTOPI) 30 TO 140
Seeseppenerally INSERT 4 horosoppeness tones and a consequence and
```

TETRA TECH INC PASADENA CA F/G 9/2
COMPUTER PROGRAMS FOR CALCULATING PARTIALLY CAVITATING BLUNT TR-ETC(U)
JAN 80 S MEKAWA: 0 FURUYA N00014-79-C-0234
TETRAT-TC-3284-02 NL AD-A081 832 UNCLASSIFIED 2 of 3 40 406/93/2

```
CAVITY SHAPE.
ALREADY CAUCULATED IN
         .YIIVAS BYITUCSEUZ
      #RITE(5+297)
  237 FORMATIZX++---CAVITY SHAPE----+)
      VCAV1=VCAV+1
      33 285 <CAV=1+NCAV1+2
  235 ARITECS+235) CAVECCAV >+CAVYCCAV >
  236 FORMATCIOX++X=++E14+7+10X++Y=++E14+7)
140 CONFINUE
      XCCC=0.
      YCCC=3.
      4RITE(5.823)
  00 321 IS4P=1.51
      x=.02*(15+2-1)
  34_ SHAPE (X+Y+BET4+3)
321 #RITE(5+822) X+Y
  322 FORMAT(5X+*X=++F10+5+2X+*Y=++F10+5)
     REHIND 7
      #RIFE(7,753) $X$I(1) #$X$I(2) #$X$I(5) #$X$I(4) #$X$I(5) #$X$I(6)
           • SXSI(7)
                                                                               C
  758 FORMAT(7F10.7)
  756 JRITE(7+767) SARC(IC)+BETAN(IC)
  757 FORMAT(2E14-7)
     D0 1766 IC=1+LP4M1
 1755 dRITE(7.757) BARC2(IC).BETAN2(IC)
      IFELTERA-SE-MSTOP) 33 TO 999
      LPK1=LPK-1
      SPACE=CSPACE
      HSPACE=HCSPAC
      D3 56 IM=1._P41
IF(IM.EQ.1) G0 T0 51
      1=(1M.EQ._P41) 90 TO 55
      I=(I4.E3._2(1) 30 T3 37
      IF (IM.EG._PK) GO TO 98
      1=61%.GT._=<> GO TO 93
      XY == 1. + SPACE + FLOAT (IM-1) + HSPACE
      XZ(1)=-1.+3PAZE+F_JAF(IM-2)
      XZ(2)=XZ(1)+SPACE
      XZ(3)=XZ(2)+6PACE
      #244)=#2(3)+59AJE
      SD TO 99
   33 SPACE=FSPACE
      HSPACE = HFSPAC
      RY=KBET+HSPACE+ SPACE+FLOAT(I4-LPK)
      XZ(1)=X9EF+SPACE+FLJAT(I4-LPK-1)
      XZ(2)=XZ(1)+SPACE
      4263)=42(2)+5PACE
      XZ(4)=XZ(3)+SPACE
   39 33 36 IK=1+4
   36 YBE(IK)=BETAN(IM+IK-2)
      CE. YX. ZEY. SX) VZ) TIA= (MI) MATZE
```

ŧ

```
30 TO 151
37 SETAMC_PK1)=0.5+(SETAVCLP(1)+BETAVC_PK))
    30 FO 151
 38 BETAMCLPK)=0.5+(BETANCLPK)+BETANCLPK+1))
    33 TO 151
 51 BETAMC1)=0.5+(BETAN(1)+BETAY(2))
33 F3 151
35 BETANC_PM1>=0.5+(BETANCLPM1)+BETANC_PM3)
151 CONTINUE
50 CONTINUE
    IF(ITERA-EQ-1) 30 TO 6
    30 41 IE=1.LPM
 PXX+(31)CVAT36+(PXX-.1)+(31)NAT36=(31)NAT3 14
    33 42 I=G=1.L241
 +2 BITAMCIFG)=BETAMCIFG)+C1.-CC4)+BETA43CIFG)+CXM
DD 425 IFG=1.LPMM1
425 BETAVE(IF3) = BETAVE(IF3)+(1.-4x4)>BETAVE(IF3)+XXM
    33 652 IRP=1.7
152 SxSI(IRP)=5xSI(IRP)+(1.-xx4)+5x5I)(IRP)+xx4
  6 ITERA=ITERA+1
    IF (ITERA-ST-MSTOP) 30 TO 28
    50 TO 160
 25 ARITE(5+29)
29 FORMAT(5x+25+11TERATLOW HAS FERMAINAFED.)
999 CONTINUE
    STOP
    END
```

C

91

```
SUBSOUTINE DEFNEW(X.STOL.M.I.DG.DF.FFF4)
            DIMENSION = (7) . P(50.7) . x(7) . Q(7.7) . xRRI(7) . xM4I(7)
             C7+7) 1430/DAT_3C/VCPPC
             COMMON /CVTYL/CAVLEN+31GS2
             COMMON/FREEDAY/XFREED.YFREED
             SATSER-COOK POPPED
             COMMON XITH(200) . XITY(200) . ANSG2S(200) . SARC2(200)
             COMMON CAVX(100) .CAVY(100) .BETAB.BETAC.XCCC.NCAV.LPMM.NS2
             COMMON AJ(100) . ISHAR . NCHBY . BBTAN(100) . BBTAN2(100) . BETAN2(100)
            APPARTIATION TO THE TOTAL TALE TO THE TOTAL TOTA
                                       SBETA- ((4-1C*I-SARCO)(513)
             POPPES
             COMMON IDJL, XA, XB, XC, TANG, EP, YC, YR, JBIGS, XL3I3S, BIGS, SMALS, DSS
            C34434 XSV(7).
                                                    C_E+ERC+fff,k4+,1FERA+SXSIO(7)+SXSIOD(7)+YXS(7)
            COMMON PSIZ-LP-SARC(513)-SARCO(513)-LPM-DE
             23440V 3ETAV(513)+3ETA4(513)+IJ+LPK+XII(200)+4JJ(200)+X3X
             COSO+8656+AASA+GRESX VOPMCO
            COMMON AAAA.BBBB.CCCC.A8.BB.CS.D6.F3AJS(100).43AUS(100).NGAUS
            P4I=3.141592653
            1=0
            1 F CI F CR 4 - LE - 3) 33 73 272
            30 67 IIJ=1+7
                                                                                                                                                                            C
      57 HRITE(5.65) IIJ.X(IIJ)
      56 F3R4AF(1x+24X(+11+24)=+114+7)
   3/2 CONFINIE
      55 311=2. DE
            S16=2.+36
            1 = 6x 61) - - F - SI 1) x (1) = SI 1
             SI10=x(1)+2.+36
             I=(x(2)._T.$I10) x(2)=$I10
            SI 11=x(2)+2.+35
            1=(x(5)._7.SI11) x(5)=$111
            I=(4(4)._[.3[6) X(4)=3[6
            SI5=(0.5+741-GAMMA)+(1.-0.02)
            1 F (x (5) .LT . 0 . ) 33 T3 78
             I=(x(5).GT.SI5) x(5)=SI5
            33 13 79
      78 [ = (A3S(x(5)) .3T.S[5) x(5) =-S[5
      3LVITHCO 61
            1= (x(7) -. 2 - 0 -) #RIFE(5 - 1123)
 1123 FORMAT(2x........X(7) IS LESS THAN ZERD------)
            I*(x(5).LE..001) x(5)=.001
            00 68 IIJ=1.7
                                                                                                                                                                            C
      (LLI)xeLII (20.2)371F# E2
            IJ=1
33 20 14=1.7
      SO AX2(IY)=X(IV)
        5 CONTINUE
            KCTRL = 1
             CALL FIINTLEVINTI-KOTRLE
             SUBROUTINE FIINTL CALCULATES THE INTEGRALS IN F(1).
             COTRL = 2
CAL_ FIINT_ (YINT2+COTRL)
            KCTRL # 3
CAL. Flint. (YINTS.CCTRL)
             KCTAL = 4
             CALL FLINT. (YINTA-KOTRL)
             CCC1=ALDG(1.+YXS(6))/(2.+PAI)
             CS1 = ALGG(COS(TXS(5)+BARRA)/CDS(4_FA1+BARRA)+TXS(7))
                                                                                                                                                                            C
             FA = -(YINF1/PAI+YINF2-(CCCL+351/PAI)+YINF3
```

```
1+YINT4/PAI-YXS(5))
         I= (IJ=E3=1) ddITE (5=70) YINT1=YINT2=YINT3=YINT4
70 FORMAT (10x+===11+12+13+14 DF =(1) ARE---++4(E14+7+2X))
                   FORMAR (19x, 40-11, 12, 13

IF (1J. E20.2) F(1) = FA

IF (1J. E20.2) 30 TO 3

IF (1J. E20.3) 60 TO 4

IF (1J. E20.4) SU TO 320

IF (1J. E20.4) 30 TO 321

IF (1J. E20.4) 30 TO 322

IF (1J. E20.4) GO TO 3222

IF (1J. E20.4) GO TO 3222
                    P(1.5) = TAV(YXS(5)+GAMMA)+YIVT3/PAI-1.
                    P(1.6)=-Y[Y[3/(2.**4[*(1.+*45(5)))
                    P(1,7) =-YINT3/(PAI+(($(7))
                                                                                                                                                                                                                                                                                  C
                    17 = 5
                    YXS(1) = X(1)+DELT(1+1)
                    30 TO 5
              3 F1P = -FA
                   [] = 5
                    Y45(1) = 4(1)-DELT(1-1)
                    30 TO 5
              4 -13 = -FA
                   P(1.1) = (=1P-F1Q)/(2.*DELT(1.1))
                    YXS(1) = X(1)
                    YXS(2) = X(2)+DELT(1+2)
                    30 FD 5
      320 F1P = -FA
                    YKS(2) = <(2)-DELT(1+2)
                    IJ = 5
                    30 FO 5
      321 F12 = -FA
                   P(1,2) = (F1P-F1G)/(2.*OE_T(1,2))
1(5(2) = ((2)
                    1 \times 10^{-3} = 10^{-3} + 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 10^{-3} = 
                    1J = 5
                    30 TO 5
      322 *1P = -FA
                    IJ=66
                    YXS(3)=X(3)-DELT(1,3)
                    13 TO 5
   3222 F10=-FA
                    YXS(3)=X(3)
                    P(1+3) = (F1P-F1Q)/(2++DELT(1+3))
                    P(1,4) = 0.
IJ = 7
      330 CONFINUE
                   XKKX = ALJGCCDS(ALFA1+SAMMA)/CDS(YXS(5)+GAMMA)/YXS(7))
XK1 = YXS(4)+SIN(JELTA)
YY1 = YXS(4)+CDS(DELTA)
                                                                                                                                                                                                                                                                                  c
                    YY12=YY1 **2
                     CCC1=ALOG(1.+YXS(6))/(2.+PAI)
                     CON1 = CCC1-XKKX/PAI
                     (44 = 5.
                    XMM = 0.
                     33 331 MIG = 1+4
                    CALL RMINTESOLNE, SOLNE, MIQ)
                    x441(413) = $3_48
                    X441 (410) = SOLN4
XRRR = -XRICHID>/PAI
```

```
144\(EIP)1PPX- = PPPX
      TF (MIGSEGS) PRRK (1063.01M) TI (CIP) TR (1063.61M) TI (CIP) TR (1063.61M)
      IF (MIG.E3.4) xRRR = -xRRI(413)
      1= (M(2.62.4) x444 = -x441(412)
      I= (IJ.EG.7) #RITE (5,71) ((RRI(I),[=1,4)
      IF (IJ.EG.7) ARITE (5,72) (X441(I).I=1.4)
   $1 = DR4AT(10K++---**RRI(I)+I=1+* OF F(2) AND F(3) ARE---*+4(E14+7+2X)
   72 FORMAT(10X++---XMMI(1)+1=1+4 OF F(2) AND F(3) ARE---++4(E14+7+2X))
      MAR = MAR+KARR
      果啡甲 二 米州州+米州州州
  351 CONTINUE
C----CALCULATION OF HICZETAI)------
      XSIP1 = XX1+1.
      45143 = XX1-YXS(1)
      XSIMF = XX1-YXS(3)
      XSIAC = XX1-XXS(2)
      xSIP12 = xSIP1 ** 2
      xSI432 = xSI43**2
      4514F2 = 4514F**2
      xSI4C2 = xSIMC++2
      RRA = SQRT(XSIP12+YY12)
      RRE = SQRT(XSIMB2+YY12)
      RRC = SQRT(XSL4F2+Y112)
      RRD = SQRT(XSI4C2+YY12)
      THIA = ATANCYY1/XSIP1)
      (EPIZX\IYY)MATA = EIFT
      EIFT+IAG = EINT (.C.S.C.BMICK) II
      THIS = ATANCYY1/XSIME)
      IF (XSIMFOLEODO) THIS = PAI+THIS
      THID = ATANCYY1/XSIAC)
      IF (XSI4C+_E+0+) THID = PAI+THID
      REPARENTE - 2381 (448-443-442)
      THIT1 = .5 + CTHI+THI3+THIC-THID)
      COTHI = COSCENITIO
      SITH1 = SIV(THIT1)
      F2C3 = RR1+(XRR+C)T41-X44+SIT41)-4_FA1
      FSC3 = RR1+(XRR+SIT+L+X4M+C3T+1)+(4<X
      If (IJ.EG.7) f(2) = -7200
If (IJ.EG.7) f(3) = -7300
      IF (IJ.E0.3) BO TO 340
      IF (IJ.EQ.9) 30 TO 541
      IF (IJ.EQ.10) 60 TO 342
      IF (IJ-EQ-11) 60 TO 343
      IF (IJ.EG.12) 60 TO 544
IF (IJ.EG.13) 60 TO 345
      I# (IJ.E3.14) 60 [D 546
      IF (IJ-EQ-15) GO TO 347
      TAZ3 = FAY(YXS(5)+3A44A)
      XCXS= XRRIC13+COTH1 - XMMIC13+SITH1
      xSxC= xRRI(1)+SIT41 + x441(1)+COT41
      P(2.5) = -RR1+TA2G+(C(S
      P(2,5) = P(2,5)/PAI
      2(3,5) = -RR1+TA23+(SKC
      P(3.5) = P(3.5)/PAI+TA23
      3"Y=2.+"AI+(1.+YXS(5))
      P(2+6)=RR1+(XRRI(1)+C)TH1-X441(1)+SITH1)/9PY
      P(3+6)=RR1+(XRRI(1)+SIT41+x441(1)+C)TH1)/3PY
      P(2.7) = RR1: XCXS/(241-1XS(7))
```

```
R(3.7) = R(1.8880/(241.988(7)) - 1.7988(7)
       [J = 3
       YXS(1) = X(1)+DELT(1+2)
  30 TO 330
340 FP2 = F2C3
      =>3 = =3C)
       [] = 3
       YXS(1) = X(1)-DELT(2+1)
       30 FD 330
  341 P(2.1) = (FP2-F2C3)/(2.+OELT(2.1))
       >(3.1) = (=>3-F3C3)/(2.*DELF(2.1))
       YX$(1) = X(1)
       YXS(2) = X(2)+0ELT(2+2)
      IJ = 10
30 TO 336
  312 = 2 = 203
FP3 = 5303
       YXS(2) = <(2)-0ELT(2+2)
       IJ=11
       30 TO 330
  333 P(2.2) = (FP2-F2C3)/(2.4)E_T(2.2))
P(3.2) = (FP3-F3C3)/(2.4)ELT(2.2))
       YX5(2) = x(2)
       YXS(3) = X(3) + OELT(2.3)
      IJ = 12
30 TO 330
  344 #72 = #203
      =>3 = =30)
       YXS(3) = X(3)-DELT(2+3)
      IJ = 13
      30 TO 330
  345 P(2+3) = (FP2-F2C3)/(2+02_T(2+3))
P(3+3) = (FP3-F3C3)/(2+02LT(2+3))
      YXS(4) = ((4)+DELT(2+4)
       145(3)=X(3)
       IJ=14
      30 TO 336
  346 FP2=F2C0
      #23=F300
      YXS(4) = X(4) - DELT(2+4)
       IJ = 15
       $3 TO 330
  347 P(2.4) = (FP24F2C3)/(2.+DELT(2.4))
      P(3.4) = (FP3-F3CD)/(2.+DE4F(2.4))
      YXS(4)=X(4)
[J=16
       YXS(1)=X(1)+DELT(4+1)
  199 CAL_ JFS142(AVS2)
       IF(IJ-EG-16) GO TO 513
IF(IJ-EG-17) GO TO 514
       IF(1J.E2.18) GC TO 575
       I#([J.EQ.17) GD TO 515
I#(IJ.EQ.20) GD TO 515
      IF(IJ.EG.21) 60 TO 517
IF(IJ.E2.22) 60 TO 513
       1 * (IJ.EG.23) &0 TO 521
       IF(IJ.E3.24) 30 T3 522
       IF(1J.EG.25) 30 TO 523
       15(11-E3-25) #0 TO 524
```

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I*([J.23.251) 63 F3 5241
    15(1J.EG.262) 60 TO 6242
    IF (IJ.EQ.271) 30 TO 5251
    IF (IJ.EQ.272) GO TO 5252
513 AVSPEAVS2
    IJ=17
    YXS(1)=X(1)-DELT(4+1)
    50 FD 199
614 ANSZEKNSZ
    IJ=1B
    P(4.1) = - (ANSP-ANSQ) / (2. + DELT(4.1))
    YXS(1):=X(1)
    SO TO 199
S/5 ANSFEANSE
    = (4) =-(3[35-AVS=)
    LJ=19
    YXS(2)=X(2)+DELT(4,2)+ABS(X(2))
    30 TO 199
SES ANSPEANSE
    1 J=20
    YXS(2)=X(2)-DELT(4+2)+A9S(X(2))
    30 TO 199
516 AVSEG=ANS2
    P(4+2)=-(AYSP?-AYS23)/C2++3ELT(4+2)+ABS(X(2)))
    YXS(2)=X(2)
    LJ=21
    YXS(3)=X(3)+DELT(4+3)+X(3)
    30 TO 199
517 AVS1 = AVS2
    IJ=22
    YXS(3)=X(3)-BELT(4,3)+X(3)
    33 TO 199
518 A4512=A482
    P(4.3) =- (ANS12-ANS13)/(2.+0=1(4.3)+1(3))
    YXS(3)=X(3)
    11=23
    YXS(4)=X(4)+DELT(4,4)+ABS(X(4))
    30 TO 199
SEL AVA=ANSE
    [J=24
    YXS(4)=X(4)-DELT(4+4)+ABS(4(4))
    30 TO 199
SELVERNY 225
    P(4,4)=-(ANA-AN3)/(2.+DELT(4,4)+A3S(X(4)))
    YXS(4)=X(4)
    LJ=25
    TXS(5)=X(5)+0E_T(4+5)
   30 TO 199
SZVA=AVE
    11=26
    YXS(5)=X(5)-DELT(4+5)
60 TO 199
624 BYB=AYS2
    ((c,q)1_30...)/(EME-AVE)-=(2.4)
    145(5)=x(5)
    EEE426(4)
    YXS(5) = X(5)
    YXS(6)=X(5)+DELT(4.5)
    1J=251
30 TO 199
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> 2 + 1	348±8425	
	LJ=262	
	YXS(6)=X(6)-DELT(4,6)	
	20 TO 199	
5242	BNB=ANS2	
	P(4,6)=-(9,4-8,4)/(2,00E_T(4,6))	
	YXS(6)=X(6)	
	· · · • · · · · · · · · · · · · · · · ·	•
	IJ=271	С
	14S67)=467)+DELT(4+7)	\$
	SO TO 199	C
		Š
3521	SZYA=AVE	ب
	YXS(7)=X(7)-DELT(4,7)	C
	IJ=272	C
	33 13 199	ř
	The state of the s	5
> 2 3 2	387 A = 6 P E	C
	P(4,7)=-(3\A-3\3)/(2.4)ZE_T(4,7))	2
	YXS(7)=X(7)	C
	-F(5) AND F(7)	•
. 1	HIS SUBROUTINE FINDS THE END POINT OF CAVITY.	
	IJ = 27	
215	CALL DAVITY (XCEND.YCEND)	
		_
; • C,Z)=YCEN) - FUNCTION(XEEND) = 0 OT B B SATISFIED	C
	IS1I2 = 3	ε
	CALL SHAPE(XCEND+YUPPER+BETA+IS1I2)	C
		•
	I=(IJ-EQ-27) 80 TO 820	
	IF(IJ.EG.28) 60 TJ 321	
	IF (IJ.E3.27) 63 TO 822	
	I = (IJ-EG-3B) SO TO 325	
	IF (IJ-EQ-31) GO TJ 324	
	LF (IJ.E3.52) 60 T0 325	
	IF (IJ.EQ.33) GO TC 326	
	1F (IJ.EQ.34) 60 TO 827	
	IF(IJ.EQ.341) 63 TO 330	
	IF (IJ.EG.35) GO TO 328	
	I = (IJ.EG.56) GO TO 329	
	I=KIJ=EG-37) 60 TO 340	
	I=(IJ-23-33)	
	IF (IJ.EG.60) GD TO 1979	C
	I= (IJ-E0-51) GO TO 1980	ř
		-
32 C	F(5)=+(XCEYD-CAVLEY)	
	F(7) = -(YCEND-YJPPER)	С
	IJ = 29	
	YXS(1) = X(1) + DELT(5+1)	
	3) f3 915	
821	AYP=XCEND	
	RZ49LY-CHZZY-TRVA	C
		·
	IJ = 29	
	YXS(1) = ((1)+0£LT(5,1)	
	3J TO 315 .	
333		
342	P(5-1)=(AYP-XCEND)/(2-+DELT(5-1))	_
	A POTENT TO THE	C
	P(7 ₀ 1) = (ANP7-ANQ7)/(2 ₀ +DELT(5 ₀ 1))	C
	YXS(1) = K(1)	-
	YXS(2) = X(2)+DELT(3,2)+A3S(X(2))	
	IJ = 50	
	30 TO 315	
04 *		
563	ANPEXCEND	_
	A 4P7=YCENO-YJBFER	C
	YXS(2) = X(2)-0ELT(5,2)+A3S(X(2))	
	1.1 - 11	

	50 TO 315	
458	P(5,2)=(AYP-XCEYD)/(2,+DELT(5,2)+ABS(X(2)))	
	73957-703C7-767A	C
	P(7.2) = (ANP7-ANG7)/(2.+DELT(5,2)+ABS(X(2)))	C
	$\forall x S(2) = x(2)$	
	IJ = 32	
	YXS(3) = X(3)+DELT(5.3)+X(3)	
	33 TO 315	
325	DV32X=9VA	
	ANP7=YCEND-YUPPER	C
	YXS(3) = X(3)-DELT(5#3)-X(3)	•
	14 = 33	
	SO TO 815	
224	P(5.3) = (AYP-XCEYD) /(2.+DE_T(5.3)+X(3))	
722	AVB7=YDEVD-YUPPER	c
	P(7.3) = (ANP7-AN27)/(2.+3E_T(5.3)+((3))	c
	II = 34	L
	YXS(3) = X(3)	
	YXS(4) = x(4)+0E_T(5+4)+ABS(X(4))	
	30 TO 815	
927	AVP=XSIND	_
	AVP7=YCENO-YURPER	¢
	YXS(4) = X(4)-DELT(5+4)+A3S(X(4))	
	IJ=341	
	20 TO 815	
350	ELNITHCS	
	P(5+4)=(AYP-XCEYD)/62++DELT(5+4)+ABS(X(4)))	
	4 42 = Y = E Y = Y = Y = Y = Y = Y = Y = Y =	S
	P(7.4) = (ANP7-AN27)/(2.+DI_T(5.4)+185(X(4)))	C
	YXS(4) = X(4)	
	YXS(5) = x(5)+DELT(5+5)	
	lJ = 35	
	30 TO 815	
328	ANPEXCEND	
	A PT=YCENO-YUPPER	C
	f(S(5) = ((5)-0)=f(5+5)	
	IJ =36	•
	33 f3 315	
925	P(5,5)=(ANP-XCEND)/(2.40ELT(5,5))	
	FERCYCENCY SPEE	C
	P(7.5) = (ANP7-ANA7)/(2.+35_T(5.5))	č
	YXS(5)=x(5)	•
	Y(\$(6)=X(5)+35_T(5,5)	
	13=17	
	30 70 315	
9 5 6	AVP=XSEND	
376	AYP7=YCENJ-YJPPER	Ç
	7XS(6)=X(5)-DELT(5,5)	•
	11:38	
	3) 73 315	
047	P(5.6)=(AYP-XCEND)/(2.+3ELT(5.6))	
	7XS(6)=X(6)	_
	ANGT=YCENO-YUPPER	c
	3(7.6) = (AVP7-AV37)/(2.*DE_T(5.6))	C
	YXS(7) = X(7) + DELT(5,7)	C
	IJ=50	C
	a) [7] 315	C
379	ANPEXCEND	C
	AVP7=YCEND-YJPPER	Ç
	wwelth - with - Asi tis. 71	_

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IJ=51
       33 TO 315
 1930 P(5.7)=(ANP-XCEND)/(2.+DELT(5.7))
       4427=YCEV3-YJPER
       P(7.7) = (ANP7-AN27)/(2.+DELT(5.7))
                                                                                              C
      YXS(7)=X(7)
I J=40
  350 CALL DESI45(ANS5)
IF(IU-EQ-40) 60 TO 351
If(IU-EQ-41) 60 TO 352
       I=(IJ-E3-42) 50 TO 353
      IF(IJ-EQ-43) GO TO 354
IF(IJ-EQ-44) GO TO 355
IF(IJ-EQ-45) GO TO 355
      I=(1J+EQ+4+) GO TO 357
       I=(IU+EQ+47) GO TO 335
       IF ([J.E2.43) 30 TO 359
       IF (IJ.EG.49) SO TO 350
       1=(1J.EQ.50) 50 TO 351
      IF(IJ=EQ=51) #0 TO 352
IF(IJ=EQ=51) #0 TO 355
IF(IJ=EQ=53) GD TO 1364
IF(IJ=EQ=54) GD TO 1365
  351 = (6) =- (AVS5-513S2)
       IJ=41
       YXS(1)=X(1)+DELT(6+1)
      30 TO 550
  352 AVPSAVS5
       IJ=#2
       YXS(1) = X(1) - DELT(5+1)
       30 f0 350
  853 P(6+1)=(ANP-ANS5)/(2.+DELT(5+1))
       YXS(1)=X(1)
      IJ=43
       YXS(2)=X(2)+DE_F(5.2)
      33 TO 350
  854 AVP#ANS5
      11=44
       YXS(2)=X(2)-DELT(5+2)
       30 TO 850
  355 P(5+2)=(ANP-ANS5)/(2++DELT(5+2))
       [J=45
       1(S(2)=X(2)
       YXS(3)=X(3)+DELT(6+3)
      30 10 350
  856 AVP=AVS5
       LJ=46
       YXS(3) = X(3) - DELT(5.3)
       33 FO 950
  357 P(6+3)=(A42-A455)/(2+43ELT(6+3))
       13=47
       YXS(3)=X(3)
       YXS(4)=X(4)+DELT(5+4)
       33 TO 850
  355 AVP=AVS5
       I J = 4 B
       145(4)=x(4)-QE_T(5+4)
       33 TO 850
  359 P(5+4)=(AYP-AYS5)/(2.+DELT(5+4))
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	IJ=49	
	YKS(4):=X(4)	
	YXS(3)=X(3)+DELT(3,3)	
	SO TO 350	
813	AVP=AVS5	
230	IJ=50	
	YXS(5)=X(3)+DELT(5+3)	
	50 TO 850	
351	P(6.5)=(AVP-AVS5)/(2.*OE_T(6.5))	
	Y x S (5) = x (5)	
	YXS(6)=X(6)+DELT(6,6)	
	IJ=51	
	SO TO 850	
352	4 VP = A V S S	
3.2	YX\$(6)=X(5)+DELT(6,5)	
	IJ=52	
	\$3 f3 350	
355	P(5+6)=(AVP-ANS5)/(2+DELT(5+6))	
	YXS(6)=X(6)	
	YXS(6)=X(5)+DELT(5,7)	C
	LJ=53	C
	30 T3 850	
1354	AYP=AYS5	Ē
	IJ=54	
	7XS(6)=X(6)+DELT(6+7)	7
	30 TO 350	~
	P(6,7)=(ANP-ANS5)/(2.+DELT(6,7))	<u>.</u>
1332		Ţ.
	YXS(7)=X(7)	5
	33 665 IK=1+7	C
	drife(5,657) (PCI(,J),J=1,7)	0
557	F3R4AT(3X++P(I+J)=++7(214+7,2K))	2
	NCAVI=NCAV+1	
	33 253 ICV=1.4CAV1.2	
253	#RITE(5.252) CAVX(ÎCV).CAVY(ICV)	
	FORMAF(10x+CAVX=++F10+5+5X++CAVY=++F10+5)	
	33 129 ITX=1+7	C
122	#RITE(5+151) ITX##([TK)	•
131	FORMAT(1X,24F(,11,24)=,514,7)	_
	00 132 IU°=1.7	C
	IF(ITERA = 15 - 3) 30 TO 385	
	DO 132 IUG=1+7	C
132	#RITE(5,133)	
133	FDR4AT(1x,24P6,I1,14,,11,24)=,E14,7)	
335	CONTINUE	
	CAL_ DETERMEP.7.DETBD)	5
	30 25 IDET=1•7	Č
	30 26 _PG=1+7	Č
	Q(LPG.IDET)=P(LPG.IDET)	
• •		
25	P(_PG, IDET) = F(LPG)	_
	CALL DETERM(P+7+DETE)	ε
	IF(IDET.EQ.1) DELB=DETE/DET30	
	Iffidet.ea.2) delc=perevoetaj	
	IF(IDET.EQ.3) DELO=DETE/DET30	
	IF(IDET.EB.4) DELE=DEFE/DETBD	
	IF(IDET.EG.5) DELF=DETE/DETSO	
	IF(IDET.ED.S) DELG=DETE/DETSD	
	IFKIDET.EQ.7) DELH=DEFE/DETBD	C
	00 27 LPG=1.7	C
		·
-	?(L?G,1DET) = 2(L?G,1)ET) -	
25	CONTINUE	

```
x(1)=x(1)+)EL3
     x(2)=x(2)+DELC
     x(3) =x(3)+)ELD
     X(4)=X(4)+)ELE
     X(5) =X(5)+)ELF
     X(6)=X(5)+3ELS
     X(7)=X(7)+DELH
                                                                                      С
     33 50 -4N=1.7
                                                                                      С
  SG BRITE(6.61) LAN.X(LAN)
  51 = DR4AT(1X+24X(+11+24)=+E14+7)
     4353=435()E_B/X(1))
     ((S)X\DJEC/REABS(DELC/X(2))
     4353=435(1E_0/X(3))
     ABSE=ABS(DELE/X(4))
     435==435(35_F/X(5))
     ((T)X\H_3C)2EA=+2EA
                                                                                      c
     A355=A35(35_G/X(6))
     <=13=0
     LF4A8S8.LT.STOL) (E10=1
LF4A8S8.GF8.TOL) (E10=0
     IF(46SD-GT-STOL) KEID=0
     IF(ABSE-GI-STOL) (FID=0
     I=(ABSF.GT.STOL) <EID=0
     1=(ABSG+GT+STDL) <E1D=0
1=(ABSG+GT+STDL) <E1D=0
                                                                                      ε
     I=(<E10.E2.1) SO TO 35
     L=I+1
     ERITE(6.42) I
  (SI.=.CV VCJTAFSTIHAL+305)TAPFC3 54
     IF41.E3.49 30 TO 35
     33 TO 55
  35 IF (I . E i . 4) 30 TO 35
     35 DJ TG 38
  35 HRITE(5+37)
  37 FORMAT(1x,34HOXFNEW DID NOT CONVERGE WITHIN 141)
     L=(x(1) - 1 - SI1) x(1) = SI1
     SI10=x(1)+2.+0G
     I= (x(2) . LT. SIID) x(2) = SI10
     5111=((2)+2.+1G
     I=(x(3).LF.SI11) x(3)=SI11
     IF6x(5) +LE+1+E+3) x(4) =1+E+3
     I=(X(4) .LT.SIS) X(4) =SI6
     SIS=(.5+P41-G444A)+(1.-.02)
     IF (x(5) - LT - 0 - ) 30 TO 31
     I= (x(5) + GT + SI5) x(5) = SI5
     3) TO 32
  31 IF (ABS(X(5)).GT.SIS) X(5)=-SI5
  32 CONTINUE
     IF (X(7).LE.O.) WRITE(5.1122)
1122 FORMAT(2X++-----+(7) BECAME LESS THAN ZERO-----+)
  33 RETURY
     END
```

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CACHICAGONATURE OF STATEMENT (CA)
         CTYSE MOISNAMIC
         CATEROCCOY VOPPCC
         COMMON XITH(200) +XITY(200) + AYSG2S(200) +SARC2(200)
         COMMON CAVX(100).CA/Y(100).BETAB.BEFAC.XCCC.NCAV.LP44.NS2
         CODISCATER (CC1)STATER (CC1)TATER TENDENS FRANCISCOLOR FOR PROPERTY FO
                                        SSET4+(<4+1021+54200)(513)
          VOPPES
         COMMON IDUL.XA.XB.XC.TANG.EP.YC.YR.JBIGS.XLBI3S.BIGS.SMALS.DSS
                                                       CLEVERCYTYY KM, ITERA, SXSID(7) , SXSIDD(7) , YXS (7)
         CTYPEX VOPPCS
         COMMON PSIZ, LP, SARC(513), SARCO(513), LPM, DE
         COMMON BETAY(513)+3:TAM(513)+IJ+LPK+XII(200)+XJJ(200)+XDX
         COSO+6656+AASA+CVCOX VOPPCO
         COMMON AAAAABBBACCCC+ABABBACBACBATSAUS(100)+MGAUS(100)+NGAUS
NOF = 0 CALLED FROM FILME.
                          = 1 CALLED FROM RMINT FOR REAL PART.
         NOF
                          = 2 CALLED FROM RMINT FOR IMAGE PARTS
= 3 CALLED FROM CAVITY DXFNEW AT F65)
         NOF
         43F
         IF (10P1.E2.0) 30 T3 9
         00 10 13 = 1+7
  10 \times ST(I_4) = \times SN(I_4)
         3) FD 12
    9 00 11 IH = 1.7
  11 XST(IH) = YXS(IH)
  12 CONTINUE
         IF(ITERA-E3-1) 50 TJ 222
         30 10 223
222 00 224 ILK = 1+LPM
224 BETANCILED = SBETA
223 CONTINUE
         CSPACE = (1.+xST(1))/FLDAT(LP()
         FSPACE = CSPACE/FLDAT(LPM-LPK)
         _243=_24-3
         XBET = -1.+05PACE+F_JAT(_P(-1)
         XSI1=-1.+CSPACE
         BE1 = BETAV(2)
         AP1 = (xSI1-xST(2))/((xSI1+1.)+(xST(1)-xSI1)+(xSI1-xST(3)))
         APIS = SGRF(API)
         F3 = 3E1*4P1S
         xx1 = xST(4)+SIV()E_T4)
         YY1 = XST(4) +325(3E_[4)
         YY12 = YY1 = + 2
         P_4 = XSI1 -XX1
         PLM2 = PLM++2
         P-44 = PL42+YY12
         PXSR = PL4/PL4A
         PXSI = YY1/PL4A
         1=(NOF.EQ.1) =3 = =3+2KSR
         I=(NOF.EG.2) F3 = F3+PXSI
         IF(NOF.EQ.3) F3=F3/((SI1-XCA)
         ANSA=0.
         JJ 1 I = 2+LP43+2
#1 = #3
         SPACE = CSPACE
         IF (I.3E._2<) GO TO 30
         XSI2 = -1.+SPACE+FLOAT(I)
         XSI3 = XSI2+SPACE
  GO TO 31
50 SPACE = FSPACE
         XSI2 = X3ET+SPACE+F_DAT(I-L2K+1)
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XSI3 = XSI2+SPACE
51 BE2 = BETAN(I+1)
   BE3 = BETAN(I+2)
   A^{2} = (xSI2-xST(2))/((xSI2+1..)*(xST(1)-xSI2)*(xSI2-xST(3)))
   AP3 = (XSI3-XST(2))/((XSI3+1.)+(XST(1)-XSI3)+(XSL3-XST(3)+)
   AP2S = SQRT(AP2)
   4P3S = SQRF(AP3)
   F2 = BE2+4-28
   F3 = 353+423S
   HA2 = XSI2-XX1
   4422 = 442++2
   H9 = 4422+YY12
   42R2 = HA2/48
   4012 = YY1/48
   HA3 = XSI3-XX1
   4432 = 443**2
   1114+55AH=CH
   HCR3 = HA3/40
HCI3 = YY1/HD
   I=(v0=.EG.1) F2 = F2+4CR2
   IF(NJF.E2.1) F3 = F3+40R3
   IF (NJF.E2.2) F2 = F2.HCI2
   If(NOF.EQ.2) F3 = F3*HCI3
If (NOF.EQ.3) F2 = F2*(XSI2-XCA)
   IF(NOF.EQ.3) F3 = F3/(XSI3-XCA)
   FSUM = (F1+4.+F2+F3)+SPACE/3.
ANSA = ANSA+FSUM
 1 CONFINUE
  .SR1 = SGRT((-1.-xST(2))/(-1.-xST(3)))
   $32 = $3RT(X$T(1)+1.)
   $23 = SGRT((XST(1)-XST(2))/(XST(1)-(ST(3)))
   AVF1 = 9EFAV(1)+2.+52RF(CSP4CE)+591/502
   ANT2 = BETAN(LPM)+2.+SQRT(=SPACE)+S33/SQ2
APLA = -1.-XX1
   47_42 = A7_4++2
   APL3 = XST(1)-XX1
   APL32 = APL8**2
   IF(NOF.EG.1) ANT1 = AVT1+APLA/(APLA2+YY12)
   I= (N)=.E3.2 ) ANT1 = ANT1+YY1/(A2.12+YY12)
   I= (NJ-863-1) ATZ = ATZ+4PL9(APL32+Y12)
I= (NJ-863-10A) = STA (S-63-10A)
   1= (NJ=+E3+3) ANT1 = ANT1/(-1+-(CA)
   I = (NOF.E2.3) ANT2 = 4NT2/(XST(1)-X3A)
   AVS = ANSA+AVT1+AVT2
   RETURN
   END
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SUBROUTINE OFSIME(ANSE)
      DIMENSION x(3)+X1F(3)+YY(3)+XITO(3)+EXU(3)+FCM3(3)+XST(7)
      COMMON YCCC.SBETA2
      COMMON XITH(200) +XITY(200) +ANSG2S(2)0) +SARC2(200)
      COMMON CAVX(188).CAVY(188).BETAB.BETAC.XCCC.NCAV.LP44.NS2
      1001) SMAT3E + (001) SMAT8E + (011) MATEE + YEHOM + SAHAI + (001) LA VCPPCC
      COMMON FLAPANODELTAGOSAPFALFALGAMMA
      KOPMES
                   SBETA+XXM+ICPI+SARCO3(513)
      C2O.CLAMC.CBIBLX.CBIEL.FY.CY.FS.GVAT.CX.BX.AX.LLDI VCPFC
      COMMON XSV(7)+
                          CLE, ERC, YYY, XM, ITERA, SXSIO(7), SXSIOC(7), YXS(7)
      C34404 PSIZ, LP, SARC(513) , SARC3(513) , L24, DE
      COMMON BETAN(513)+BETAN(513)+IJ+L2K+XII(200)+XJJ(200)+XDX
      C3S3.EESE.FASA.EVLCRX VCPPC3
      COMMON AAAA, 9989.CCCC, A8, 98, C5, 36, T3AUS(100), J3AUS(100), N6AUS
      JO 13 IS=1.7
   13 KS[(IS)=YKS(IS)
      PAI=3.141592653
      CCC1=AL36(1.+XST(6))/(2.*PAI)
      UJ2=CDS(A_FA1+GAM4A)/DDS(XST(5)+GAM4A)/XST(7)
      X < 4 < = 4 _ 3G ( J J 2 )
      CSPACE=(1.+ XST(1))/=_DAT(_>C)
      HCSPAC=0.5.CSPACE
      FSP400=0SP40E/FLOAT(LPM-LPK)
      HFSPAC=G.5+FSPACE
      xaet==1.+cspace+f_par(_pk=1)
      CDE=CDS(DE_TA)
      SDE=SIN(DE_TA)
      5A=4S((1)-4ST(4)+5DE
      33=XST(4)+CDE
      ???=CDE/(34++2+38++2)
      FCN3(3)=D3AP+PPP+XST(1)/4PAI+SQRT(1.+XST(5)))
      L2KI=L2M-L2K+1
      33 1 1P=1+_PM
      I=(I2.E3.1) G3 T3 2
      HSPACE=HFSPAC
      SPACERESPACE
      1 - (1 - 6 T - 2 - 4 T ) GC TO 30
      x(1)=xST(1)-SPACE*F_JAT(IP-2)
      x(2)=((1)-45PACE
      x(3)=x(1)-SPACE
      33 73 31
   30 45PAGE=4C5PAC
      SPACE=CSPACE
      X(1)=x3ET-SPACE+FUJAT(IP-LP(I-1)
      X(2)=X(1)-HSPACE
      x(3)=x(1)-SPACE
   31 FCN3(1)=FCN3(3)
      4<=3
      I=(I=.E3._24) N<=2
      30 8 1=2.NK
      1 - CIU+3E+23) 60 TO 3
      30 TO 7
    3 I=(1.E2.2) xIT(2)=xIT4(_P4-LP+1)
      I=61.52.3) xIT(3)=xIT(6L24-1P+1)
      $3 TO 5
    7 CONTINUE
      YY(I)=X(I)
2 DESIGN CALCULATE 31 . CALL DESIGNACION XITO(I) + IP+I)
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XIT(I)=XITC(I)

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I= (IJ. EG. 13) 30 TO 5
                               30 TO 5
                     $ IF([.22.2) x[[4(_24-[2+1)=x[f(])
                                IF(L.EQ.3) XITN(LPM-IP+1)=XIT(I)
                     5 CONTINUE
                                EXU(1)=EXP(-X1T(1))
                                302x(1)-x5f(4)+505
                                30=45[(4)+03E
                                PXA=G: +2+33+42
                                DUDK=JGAP+X(I)+CDE/(PXA+PAI)
                               FCN3(I)=EXU(I)+DHDX/HUR
LF(X(I)+LE+D+) FCN3(I)=-FCN3(I)
S CONTINUÉ
CONTRACT SYAMMA SI (1500) ECONTRACTOR CONTRACTOR CONTRA
                                30 TO 21
                20 PP2=C3E/((-1.-xST(4)+S3E)++2+(xST(4)+C3E)++2)
                                FF3=DGAP+PP3/PAI
                                 F2N3(3)=FF3
                 21 SJ4=(=CY3(1)+FCY3(2)+4.+FCY3(3))+4SPACE/3.
                                MLZ+SZVA=SZVA
                                I=(IJ.E2.13) SARC(_24-12+1)=AVS2
                     30 TO 1
2 SARD(_P4)=0.
2 34332-0.

ANS2-0.

1 CONTINUE

2 KITY(_PM)=31 AT POINT 3.

2 KINT(1)=G1 AT POINT x=1.

XITY(_PM)=C321-KK<//PAI
                                XITN(1)=0.
                                RETURN
                                END
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SUBROUTINE OFSIMBOY+X4II+IP+I)
                         DISENSION XST(7) .FA(200)
                         234404 YC23.58E1A2
C34434 KIF4(200).KIF4(200).ANSG2S(230).SARC2(203)
                         COTTON CAVE(100) +CAVY(100) +BETAB+BETAC+ECC+NCAV+LPHH+NS2
                         CODIDERATE COCIDERATE COCIDERATE CONTRACTOR 
                                                                            SBETA-444-10PI+SARCO3(513)
                          VCPPCS
                         COU-SALE + COLOUNCE - SCIEL + SALE + SALE + CALE + 
                        C34404 X54673+ C_E+ERC+FMY+44+ITERA+SX:
C34434 PSLZ+LP+SARC(313)+S44C3(313)+_P4+DE
                                                                                                     C.E.ERC. TYY. 44. ITERA. SXSIO(7) . SXSIOO(7) . YXS (7)
                         COMMON BETAN(513)+9: FAM(513)+IJ+LPK+XII(200)+XJJ(200)+XDX
                       COPPON X7JVO-A2AA-3233-C2CC
CDMON AAAA.8386.CCCC-886.88.CDMCAV COO).4GAUS(100).NGAUS
CDMCON AAAA.8386.CCCC.886.88.CDMCCT.80C.000.4GAUS(100).NGAUS
FJL IN E3FALLS TO BE EVALUATED IX JEFT IX THE THAT PRIVICE THAT PRIVICE THAT PRIVICE THAT PRIVICE THAT STORMAN AND CASCASE.
                         SEE THE NOTE OF TO 3951 FOR FOUR INTEGRALS. OUT OF WHICH
                         THO ARE OF SINGULAR TYPE.
                         I=(IC>I.E2.3) 33 T3 3
                        33 11 ISI=1.7
            11 XST([SI)=xSV([SI)
                        30 10 12
               9 23 13 JTJ=1.7
            12 KST(UTJ)=(KS(JTJ)
            12 PAI=3-141592653
                        CCC1=ALOG(1.+xST(6))/(2.+PAI)
-----FIRS I1-----
                    17 (17ERA-E2-1) 30 FD 60 30 FO 51
           SC CONTINUE
                        33 52 120 = 1+L24
                        BETANCIZU) = SBETA
                         BETAMCIZU) = SBETA
            32 CONTINUE
            STALLANCE TS
                         CSP4CE=(1.+ XST(1))/=_DAT(_>()
                         HCSPAC=G.5+CSPACE
                        FSP40E=05P40E/F_J4T(_>4-_><)
                        HFSPAC=0.5+FSPACE
                        XBET=-1.+CSPACE+F_DAT(_P(-1)
                        A32=S2RT(XST(1)+1.)
                        433=S2RT((1.+Y)=(XST(1)-Y))
                        436 = SSKF((XSF(3)-f)/(XSF(2)-Y))
                        AB3 = AB3+AB6
                        [12=_24-[2+1
                         LU3=1
                         I=(I.23.3) IU3=L24-12+1
                         1 = (1...23.0) IU3=IP
                         BEC=BETAN(IJ3)
                         IF(I.E2.2) 3EC=3EFA4(IJ2)
                         FAA=BEC/A33
                          _ 241 = _ 24-1
                        00 1 IN=2.LPM1
                         SPACE=CSPACE
                        IFCIW-ST-_PK) 60 TO 45
                         xS<=-1.+S*ACE+F_DAT([d-1)
                        50 FG 46
           SE SPACE=FSPACE
                        XSC=XBET+ SPACE+FLOAT(I#-LPC)
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*6 IF(I.E2.2) 30 TO 6
   I (14.63.133) 60 fo 1
 6 *S=SQRT((1.+xSK)+(xST(1)-xSK))
  #5A1 # SQRT((XST(3)-45<)/(XST(2)-45<))
#5 # #5+#5A1
   FACIH)=(BETANCIH)/FS-FAA)/(XSC-Y)
 1 CONTINUE
   LF(1.62.2) SO TO 30
   191=-1. +HCSPAC
   XP2=XP1+CSPACE
   x24=X51(1)-4F5P42
   433=X34-F334CE
   FS1=BETAM(1) / SGRT((1.+x21) + (XST(1) - XP1))
   FS2=6ETAM(2) / S3RT((1,+x22)+(x5T(1)-x22))
   FS3=BETAMCLPM-2)/ S3RT((1.+x03)+(xST(1)-x23))
   #$4=8E[A4(_24-1)/ $32[((1.+424)+(K$[(1)-X24))
   FSA1 = SGRT((XST(2)-XP1)/(XST(3)-(P1))
   #$42 = SQRT((XST(2)-XP2)/(XST(3)-XP2))
   *$A3=$47((K$F(2)-(*3)/(K$F(3)-(*3))
   FSA4=SGRT((xST(2)-x24)/(xST(3)-x24))
   F31=F31+F5A1
   FS2=FS2+FSA2
   #53=F53+F543
   *$4=#$4+#$44
   ==1=(=S1-=44)/(XP1-Y)
   *>2=(*52-*44)/6(>2-f)
   FP3=(FS3-FAA)/(XP3-Y)
   F34=(F54-F44)/(X84-7)
   IF(IU3.EQ.2) GO TO 21
IF(IU5.EQ.241) GO TO 22
   ITCIUS.EG._PK# 30 TO 51
   FA(IU3)=0.5+(FA(IJ3-1)+FA(IJ3+1))
   23 13 30
51 SETO=2. + SETANCLPK) - SETANCLPK+1)
   ADATABET-FSPACE
   FPW=BETD/S2RT((1.+x)4)+(XST(1)-X04))
   FPHA = SQRFC(XST(2)+(3A)/(XST(3)-X3A))
   £2**£24¥*£34
   T_F<=(FPW-=4A)/(X)4-Y)
   FACLUS>=0.5+(FACLUS+1)+F_2<)
   50 TO 30
21 -4([J3)=(->1+++2)/2.
  SD TD 30
22 F4([U3)=(FP3+FP4)/2.
50 XI=3.
   _243=_24-3
   SPACE=CSPACE
   00 15 JA=2+LPM3+2
   IF (JA.SE.LPK) SPACE=FSPACE
15 X[=X]+(FA(JA)+4.+FA(JA+1)+FA(JA+2))+SPACE/3.
   If([.E3.2) GO TO 35
R123=0.5+4CSPAC+(F21+FA(2))+(FA(L24-1)+FP4) +0.5+4FSPAC
   x<1=41.
   くり=39
   LPMAZLPM-5
   I=(143.3E.LPM4) X<I=201.
   IF(IU3.3E._24A) KU=133
   1)X\((1)YAT38-(1)PAT36)=5C6
   1>> \ ((1P4_) P 1 1 2 E - (P4_) P 1 2 E) = YCE
   HFF=HFSPAI/XKI
```

```
4=4=435PA2/x<1.
    FT3=F01
    FJ3=F34
    X[4=0.
    x [ ] = 0 .
    33 202 1T4=1+<J+2
    =T1=FT3
    FJ1=FJ3
    XM2=XST(1)-MFSPAC+H=F+FLDAT(ITH)
    X43=X42+H==
    KTZ=-L.+HOSPAC-HFH+F_DAT(ITH)
    X13=X12-H=4
    SETAZ=SETA4CLP411+3)**F_DATCIT4)
    YC8+SATIREATIE
    (P71)7AC_=+5CE-(1)PA73E=5773E
    BETT3=BETT2-BOZ
    =52=8ETA2/S2RT((1.+x42)+(x5T(1)-x42))
   #$3#8ETA3/$QRT((1.+x43)+(K$T(1)-X43))
    FV2=0ETT2/S2RT((1.+(T2)+(XST(1)-XT2))
    FV3=8ETT3/S2RF((1.+(F3)+(4SF(1)-4F3))
    FS24 = SGRT((XST(2)-X42)/(XST(3)-X42))
    #534 = SQRF((XST(2)-(43)/(XSF(3)-X43))
    FV24 = SGRT((XST(2)-XT2)/(XST(3)-XT2))
    = V34 = SURT((xSI(2)-(T3)/(xSI(3)-xT3))
    FS2 = FS2+F52A
    FS3 = FS3+FS3A
    F/2 = F/2+F/2A
    FV3 = FV3+FV3A
    #J2=(#$2-#A4)/(X#2-1)
    FJ3=(FS3-FAA)/(X43-Y)
    =T2=(=V2-F44)/(XT2-Y)
    FT3=(FV3-FAA)/(XT3-()
    X14=X14+H==+(FU1+FU2+4++FJ3)/3+
232 461=x61+4F4+(FT1+FT2+4++FT3)/3.
    XA4=BETAN(LPH)+2.+SZRT(HFF)/(A82+(XST(1)-Y))
    XA4A = S2RF((XST(2)-(3T(1))/(XST(3)-XST(1)))
    XA4 = XA4+XA4A
    ¥[4=¥[4+¥44
    441=8274V(1)+2.+5327(4F4)/(492+(-1.-Y))
    XA1A = SGRT((XST(2)+1.)/(XST(3)+1.))
    X41 = X41+X414
    XI1=XI1+XA1
    XI=(XI+X123+XI1+XI4)+A33/P4I
    XI=XI+3EC+AL36((XST(1)-Y+4F*)/(1++Y-4F4))/PAI
    xxI1=-XI
    33 13 36
35 XR1=-1.+0.5+HCSPAS
    XR2=XR1+HC5PAC
    XR4=XST(1)-0.5.HFSP45
    XR3=XR4-HFSPAC
    FT1=0.5+(3ETAN(1)+BETAN(1))/ SQRT((1.+xR1)+(xST(1)+xR1))
    FT2=0.5+(3ETAM(1)+9ETAM(2))/ SQRT((1.+xR2)+(xST(1)+R2))
Ff3=0.5+(3ETAM(_24-1)+3ETAM(_24-1))/ SQRT((1.+xR3)+(xST(1)+RR3))
    #T4=0.5+(BETA4(LP4-1)+BETAN(LP4))/ SORT((1.+XR4)+(XST(1)-XR4))
    FT14 = $271(1x$1(2)-(71)/(x$1(3)-(41))
    #T2A = SGRT((XST(2)-XR2)/(XST(3)-KR2))
    FT34 = $24T((x$1(2)-x43)/(x$1(3)-x43))
    TTAA = SGRTE(XST(2)-KR4)/(XST(3)-KR4))
    #11 = #11+#11A
    *T2 = *T2+FT24
```

```
*13 = FT3+FT3A
   FT4 = FT4+FT4A
   FRI=(FTI-FAA)/(XRI-Y)
   = R2=(= T2-= AA)/(xR2-T)
   FR3=(FT3-FAA)/4xR3-Y)
   FR4=(FT4-F44)/4xR4-Y)
   KIP1=3.5+40SPAC+(FR1+FR2)+3.5+4FSPAC+(FR3+FR4)
   XIP2=0.25+4CSPAC+(FR2+FA(2))+0.25+#FSPAC+(FA(LPM-1)+FR3)
   XI23=KIP1+KIP2
    XMI=21.
    X412=42.
    4J=21
    42=#U-2
    _244=_24-5
    IF(IU2.GE.LPMA) XMI=101.
    IF(IU2.3E._PMA) X412=202.
    IF (IU2.GE.LPMA) MU=131
   IF([J2.3E._244) 42=4J-2
   9ETY=(3ET4Y(LPM)-3ET44(LPM-1))/(412
   3555=1.5+(3ETAN(L2M)+35TAM(_24-1))
    4575=0.5*4=57AC/X41
   F23=F34
    35TY1=68ETA4(1)-85T44(1))/X412
    BESS1=0.5+(BETAM(1)+BETAM(1))
    45751=0.5.4057A0/X4[
    #331=#R1
    XI1=0.
    <14=0.
    DO 129 IL=1.M2.2
    F21=F33
   F211=F031
   x2=x5((1)-45P5+=L)A((4J-[_)
    43=42+45P5
    X21=-1.+HS=51+FLOAT(4J-IL)
    431=X21-43*51
    BETA2=BESS+BETY+FLOAT(IL)
    BETA3=BESS+BETY+FLD&f(IL+1)
    SETA 21 = SESS1 - SETY1 + FLOAT(IL)
    357431=357421-35771
    #J21=3ETA21/ $2RT.((1.+K21)+(K$T(1)-(21))
    FU31=8ETA31/ SGRT#(1.+x31)+(xST(1)-x31))
   =J21A = S2RTC(#ST(2)-421)/(45T(3)-421))
    FJ31A = S2RT((xST(2)-x31)/(xST(3)-x31))
    FJ21 = FU21+FJ21A
    FJ31 = FU31+FU31A
    #221=(#U21-FAA)/(X21-Y)
   F331=(FJ31-FAA)/(431-f)
   FJ2=8:TA2/ SQRT((1.+x2)+(xST(1)-x2))
FJ3=8:TA3/ SQRT((1.+x3)+(xST(1)-x3))
    #J2A = $QRT((XST(2)-X2)/(XST(3)-X2))
    FJ3A = $28f((x$f(2)-(3)/(($f(3)-x3))
    #U2 = #U2+#U2A
    *13 = #13+#13A
   #32=(#J2-#44)/(x2-Y)
   FG3=(FU3-FAA)/(X3-Y)
    x[1=x[1+45°51*(FQ11+FQ21*4*+FQ3L)/3*
129 XI4=XI4+HSP6+(FQ1+4.+=32+=33)/3.
    XIA=2. + SQRF(HSP5) + 3EF4 V(_24) / (A32+((ST(1)-Y))
    XIAA = SQRTC(XST(2)-XST(1))/(XST(3)-XST(1)))
    XIA = XIA+XIA4
```

```
413+41X=41)
      *18=2. * SGRT(HSP61) *3ETAN(1)/(A32*(-1.-Y))
      #134 = SQRF(C#ST(2)+1)/C#ST(3)+1.))
      AEIX-BIX = EIX
      Elx+flx=flx
      XI=(XI+XI1+XI23+XI4)+A83/PAI
      XI = XI + 3EC + 4LO3((XST(1) + Y - 4SP6)/(1.+Y - HSP61))/PAI
      1112-41
   36 CONTINUE
;-----I2----
C-----IF Y IS LESS THAN ZERO, THIS IS A C----REGULAR INTEGRAL, AHLE Y .3E. D. 1415 IS A
:----SINGLAR INTEGRAL.
      BUT THIS IS TREATED AS A SINGULAR INTEGRAL ANYWAY
      1310=3
      XCA=Y
      CALL IC2(SR+S4+XCA+1SIC)
      XXI2=SR
      433.=(xST(1)
      IF (ARGUALTADA) ARGUS-ARGU
(ARGE) ARGUS (ARGU)
      44122-4412
J----I3-----
      JSE CHEBYSHEV-SAUSS BUADRATURE.
      AURID ARE ALREADY CALDULATED IN SUBROUTINE FLINTL
      ATMENETATE MERPES YE SHEN CTHE CARRAGE CHA
      4413 = 0.
      3°C5 = (XST(1)+XST(2))+.5
      2435 = (x$((2)-x$((1))+.5
      A31 = (8PC5+1+)/CM85
      A32 = (-8°05+xST(3))/0485
      20 120 ISJ4 = 1.NC43Y
      (PL2I)LA-1 = 1AH
      142 = (4J(15J4)+431)+(432-4J(15J4))
      SHA2 = SURT(HA2)
      F313 = 441/5H42
      F3A13 = C485+AJ(ISU4)+9PC5-Y
  120 4x13 = xx13+F313/F3413
      XXI3 = XXI3+PAI/NCH3Y
      JJ22 = COSCALFAL+SAMMA)/COSCXST(5)+SAMMA)/XST(7)
      443 = CCC1-4L38(JJ22)/741
      EXH-EEA-EIXX = EIXX
      JSE CHEBYSHEV-GAUSS BUADRATURE FORMULA---
2-----BEFANC(I) ARE ALREAY CALCULATED IN
C SUPROUTHE FILTURE AND PASSED ON TO HERE BY
      COMMON STATEMENT.
      FPC5 = (XST(3)+XST(2))+.5
      *4C5 = (XST(3)-XST(2))+.5
      441 = (FP35+1.)/F405
      A42 = (FPC5-X8T(1))/FHC5
      X4I4 = 0.
20 130 ISJ4 = 1.NCH3Y
      RAX = (38TAY2615U4)+041)+(1.44U615U4)
RAX = (3U615U4)+441)+(4U615U4)+442)
      SREAT = SGRT(REX)
      RCX = RAX/SRBK
      RDX = FMC3+AJCISUM)+FPC5-Y
  150 MKIN = MINK 051
      XXI+ = XXI++PAI/NCHBY
```

C

```
| XXI4 = -XKI4+A83/PAI
| XXII = XXII+XXI2+CXI3+CXI4
| IARIT1=2
| IARIT3=60
| IARIT3=60
| I= (IJ=20-190AND-IP-E30-IARIT1) | ARITE(5055) | XXII0XXI20XXI3 | 0XXI40IP
| I= (IJ-E0-130AND-IP-E30-IARIT2) | ARITE(6055) | (XII0XXI20XXI30XXI40IP
| I= (IJ-E0-130AND-IP-E30-IARIT2) | ARITE(6055) | (XII0XXI20XXI30XXI40IP
| I= (IJ-E0-130AND-IP-E30-IARIT3) | ARITE (6055) | XXII0XXI20XXI30XXI40IP
| I= (IJC0-130AND-IP-E30-IARIT3) | ARITE (6055) | XXII0XXI20XXI40IP
| I= (IJC0-130AND-IP-E30-IARIT3) | ARITE (6055) | XXII0XXI20XXI40IP
| I= (IJC0-130AND-IP-E30AND-IP-E30AND-IP-E30AND-IP-E30AND-IP-E30AND-IP-E30AND-IP-E30AND-IP-E30AND-IP-E30AND-IP-E30AND-IP-E30AND-IP-E30AND-IP-E30AND-IP-E30AND-IP-E30AND-IP-E30AND-IP-E30AND-IP-E30AND-IP-E30AND-IP-E3
```

```
SJBROJTINE JFSI45(4455)
      014E48104 32S4(101),32(E4(101),48F(7)
      COMMON YCCC. SBETA2
      C3440N X114(230)+X114(200)+X48328(230)+SARC2(203)
      COMMON CAVX(100) . CAVY(100) . BETAB. BETAC. XCCC. NCAV. LPMM. NS2
      C0013 SYATEE (CC13SYATEE (CC13VATEE (FF) VC+SAFEI (CC13C) +3ETAV2 (100)
      COMMON FLAPANADELTRADGAPAALFALAGAMMA
                   SSETA+xx4+ICPI+SARCO3(513)
      PCPFCC
      CJ440N IDJ_+XA+43+K3+FANG+EP+fC+YR+J316S+KL316S+316S+S4AL6+DSS
      COMMON XSN(7)+
                          CLE. ERC. YMY. XM. ITERA. SXSIO(7). SXSIOO(7). YXS(7)
      COMMON PSIZALPASARC(513)ASARCO(513)ALPMADE
      COMMON BETAN(513) - BETAM(513) - IJ - LPK - XII(200) - XJJ(200) - XDX
      CCSO.EESE.AASA.GRUCAX NOPPEC
      SUABR+(881)3LABb+(881)SUAGT+8C+63+66+6A+3C333+666B+AAAA RCPPC3
      RAI=3-141592644
      FAIS SUBROUTINE CALLED FROM DEFNERS
      SE SIMPSONTS RULE.
      33 1 IN3 = 1+7
                                                                                    0
    1 AST(I40) = YXS(IMO)
      CDE = CDS(DELTA)
      SDE = SIN(DELTA)
   452 SHOULD HAVE A FACTOR OF 4.
3 452=_>44=_>42
      NS21 = NS2+1
      4524 = 452-1
      S2GAP = (XST(3)-XST(2))/VS2
      JJ2 = C35(A_FA1+3A44A)/C35(x51(5)+3444A)/XST(7)
      33 2 IS2 = 1.4821
      XS2 = XST(2)+S23A2+(ES2-1)
      1() = (S2+3)E
      3C2+(4)12X-S2X = ZAPX
      X4AS2 = X4AS++2
      ASD = XST(4)+CDE
      ASD2 = AS3++2
      JAJX = DGAP+X4D/((X4A52+4SD2)+PAI)
      I= (IS2.E2.1) 60 TO 3
      I= (152.E3.VS21) 33 E3 4
      CALL 32 (XS2+ANSG2+I52)
      32 CALCULATES 52 HIF4 XSI SIVEN.
      EG2 = EXP(-ANSG2)
      1=(1J.E2.40) ANS325(132)=AVS32
      SEKER(ISE) = ESE+D#D(/JJE
      30 TO 2 .
    3 CONFINUE
      S2KER(1) = DWDX/SQRT(1++XST(6))
      445325(IS2)=A_03(SQRT(1.+45T(5))/JJ2)
      33 TO 2
    3LVITACO 4
      SEKERCYSELD = DADK/JJE
      A 455 25 ( I 52) = 0.
    S CONLIATE
      $2$R(1) = 0.
   33 10 JS2 = 1.NS2A.2
10 S2S3(JS2+2) = S2S3(JS2)
     1+($2KER(J$2)+4.*$2KER(J$2+1)+$2KER(J$2+2))*$2$A2/3.
      IFEIJANEAAD) SO TO AD
      SARC2(1)=0.
      3.528.5=CFARI 06 CC
   50 $2$R(ISARC)=.5+($2$R(ISARC+1)+$2$R(ISARC+1))
      33 30 ISARC=1.4521
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3C SARJ2(ISARJ)=S2SR(ISARJ) 3O CONTINUE ANSS = S2SR(NS21) RETURN ENO

```
SUBROJITNE IC2(SR.S4.(CA.ISIC)
   DIMENSION KST(7)
COMMON YCCC, SBETA2
COMMON XIC1(200),ANSG2S(200),SARC2(200)
   COMMON CAVX(100)+CAVY(100)+3ETAB+3ETAC+XCCC+NCAV+LPMM+NS2
   CODI)SVATEC. (CCI)SVATEE. (CCI)NATEE. VEHON. CAAPAI. (CCI)UA VCPPCC
CPPCC APAIGC. (APAIGE APAIGE)
                 SBETA . KX4 . ICPI . SARCOD (513)
   VOPRCO
   COMMON IDJL, XA, XB, XC, FAVG, EP, YC, YR, JBIGS, XLBIGS, BIGS, SMALS, DSS
                        CLE.ERC.YYY.XM.ITERA.SXSID(7).SXSIDD(7).YXS(7)
   COMMON XSV(7)+
   C3440V PS[Z.LP.SARC(513),SARC)(513), LPM.DE
   COMMON BETANCELED + BETANCELED + (1) + L2K+ XII(200) + (JJ(200) + XJX
   COSO - EESE - PASA - GYUCAX NOPPCO
   2UADN+(001)2L424, 1001)2UAG7+8C+8C+8C+6CCCC+8E66+AAAA NCPPCC
   30 1 IPV = 1.7
 1 XST(IPN) = YXS([PN)
   xx1 = xST(4) + SIV(DE_T4)
   YY1 = xST(4) + COS(JE_T4)
   YY12 = YY1**2
   TYIMS SCE C = CIZI
        = 1 IN CAVITY OF OFSIAS FOR FEST AND IN CAZITY.
           2 DALLED FROM FIRML FOR F(1).
3 FOR L2 OF F(4).
   SR=0.
   34=6.
   94=XST(1)+.5
   3 mC=5m+xST(2)
   3421=34+1.
   34MF=34-X5T(3)
   311=5440/34
   312=9471/5#
   313=344=/34
   IF(ISIC.NE.3) 30 70 20
   AP1=(xCA+1.)+(xST(1)-xCA)+(xCA-xST(3))
   4 2 2 = X 2 4 + 4 5 F (2)
   APS=S2RT(471/472)
BUNITACO 05
   DD 7 ISUM=1.NCHBY
   RA=(AJ(ISJ4)+311) +(AJ(ISJ4)+1.)
   13=(AJ(ISJ4)+812)*(AJ(ISJ4)+813)
   SAS=SURT(RA/RS)
   SAC=84*S2RT(1.-4J(15J4)**2)/S48
   HE+ (MLZI)LA+HE= CIZX
   x>x>=xSIP-xx1
   X>Y>2=XPX>**2
   1/2=X3XP2+YY12
   343=X2(2/3/2
   RAI=YY1/RV2
   I# (LSIC.23.1) R#R=1./(xSIP-YCA)
   If(ISIC.E2.2) RWR=1.
   I=(ISIC.E3.3) RdR=(1.-SAC/A25)/( xSI2-xCA)
   SR=SR+SAS+RWR
 1 S4=S4+SAB+R4I
   241=3-141592654
   SR=SR+PAI/YCHBY
   S4=S4+PAI/VCHBY
   RETURN
   EVB
```

С

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SJEROUTINE FIINTL(YINT+KOTRL)
   DIMENSION KST(7)
   COMMON YCCC+SBETA2
   COMPON XITH(200)+KIFN(200)+AV532S(200)+SARC2(200)
   COMMON CAVX(100)+CAVY(100)+BETAB+BETAC+XCCC+NCAV+LFMM+VS2
   COMMON AJ(100), ISHARP, NCHBY, BBTAN(100), BBTAN2(100), BETAN2(100)
   SPHAR FLAFANDELTADDAPPALFA1 DAMMA
   POPPES
                SBETA . XX4. ICPI, SARCOD(513)
   CZGG-ZAMAC+GZIG+GZLGLY+GZIEL+YC+YC+YC+YC+YC+LLCI VCZ+ZLCI VCP+CZ
   COMMON XSN(7). TLE.ERC.YY.Y.XM.ITERA.SXSIO(7).SXSIOQ(7).YXS(7)
COMMON PSIZ.LP.SARC(513).SARC)(513).LPM.DE
   COMMON BETAN(513)+BETAM(513)+IJ+LPK+XII(200)+KJJ(200)+XDX
   COSC, EES E+ PERA, CULCRY VOPPED
   CD440V AAAA.BBBB.CCCC.AB.BB.CB.CB.FSAJS(100).4GAJS(100).NGAUS
   SUBROUTINE FIINTL CALCULATES THE INTEGRALS IN F(1)
   ISAR? = 0 FOR SHAR? _.E.FOILS.
   IF FOILS HAVE ROUNDED L.E. CHEBYSHEV-GAUSS
   ATER SONIE FOR SET OF VALUE HOLDER A TON IS NOT A STORE HOLDER.
   *STRICE LOSTREE SELTANDALE SEUACHORENDED OF FEBRUAR YEARS
   PAI = 3.141592654
   F (IC=1.62.0) 60 TO 9
00 70 IQ = 1+7
70 XST(IQ) = XSN(IQ)
   33 [3 12
 9 00 11 IF = 1+7
L1 XST(IH) = YXS(IH)
  BLVIIVCE
  3V1 = (XST(1)+1.)+.5
   JN2 = (XST(1)-1.)*.5
   A11 = (CN2-XST(2)):/3V1
   A12 = (3N2-XSF(3))/3N1
BC5 = (4SF(1)+XSF(2))+.5
   CM85=(XST(2)-XST(1)) *+5
   431 = (305+1.)/0435
   A32 = (-805+XST(3))/0495
   FCA5 = (xST(3)-xST(2))***5
   FC15 = (XST(3)+XST(2))+.5
   A41 = (FC15+1.)/FCA5
   A42 = (FC15-KST(1))/FCA5
   SPACE2 = (XST(3)-XST(2))/LPMM
   READ LPMM FOR THE SECOND ARC.
   IF (KCTRL-95.2) 30 TO 100
   IF(IJ.3E.2) GO TO 100
   CSPACE = (1.+XST(1))/FLDAT(_PK)
FSPACE = CSPACE/FLDAT(_PK)
   134 = 1
   XCHCK = -1
   SPACE=CSPACE
   20 ICHBY=1.NCHBY
   VCH=NCHBY-ICHBY+1
   SVC+(YEECI)LF+IVC=IZ>X
   IFCITERA-EA-1) 50 TO 488
22 If(XC4CK.GE.XESI) GD TO 21
If(IO4.GE.PK) SPACE = FSPACE
   XCHCK = XCHCK+SPACE
   IOM = IOM+1
```

c

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33 TO 22
     INCIDIZA CHA (1-MOIDIZA ETE ZTZIKE IZDA
         ST COALTATE
                  104-1 = AMCI
                 (CAMCI) MATBE-(PCI) MATBE)+(MCI) MATBE = (YEHOI) MATEE
               X+(XKSI+XCHCK)/SPACE
                 BETAN IS USED FOR CHESYCHEV-GAUSS INSTEAD OF BETAN.
                  30 TO 20
      438 33TANCICHBY) = SBETA
C BETAN FOR ITERA-ED-1 IS SPECIFIED IN OFBIMI-
        20 CONTINUE
      LOO CONFINGE
                  IF (KCTRL.EQ.4) 30 TO 4
                IF (<CTRL=E2=3) G0 F0 3
IF (<CTRL=E2=2) G0 F0 2
IF (ISHARP=E2=1) 30 F0 10
                 YINT = 0.
                 00 110 ISJM = 1.NCHBY
                 ABC = (AU(ISU4)+A11)/(AU(ISU4)+A12)
      110 YINT = YINT +88TAN((SU4)+SGRT(A8C)
                 YERCHIAG+THIY = THIY
                 30 TO 1000
        10 CONTINUE
CECKS EVILENAL DE CASE DE HANDLING RADED L. E. .
                 NOF = D
                 XIA = 0.
                 CALL DESIGLOYINT+NDF+XCA)
                 ACA IS DUMMY. DALK USED FOR F(5) INDXFVEW.
                  30 FO 1033
            2 CONTINUE
                 CCA=0.
C XCA IS DUMMY.
                 ISIC=2
                 CALL [32(57,54,XC4,[S13)
                 YINT=SR
                 33 73 1000
            3 CONTINUE
D-----ENTEGRAL FOR 13.
C. AUCHO IS CALCULATED AND STORED
                 YINT = 0.
                 33 120 ISJ4 = 1,NC+3Y
                 A31 = 1.-4J(ISJ4)
                 A32 = (AUCISUA)+A31)+(A32-AUCISUA))
                 STABE = STRT (ABE)
                 SEASE = 264
      120 YINT = YINT+ABC
                 YINT = YINT+PAI/NCH3Y
                 30 TO 1000
         PI POT LAND TO THE CONTROL AND THE STATE S
                AJ(N) IS ALREADY CALCULATED.

IF THIS IS THE FIRST CASE FOR BETANZ.

USE A CONSTANT FOR BETANZ.

BETANZ IS JSED FOR CHEVY-BAJSS INSTEAD OF BETANZ.
            SUVITIVES #
                  I=(ITERA.3E.2) 30 TO 150
IF(IJ.35.2) GO TO 191
S SETA2 MUST BE READ FOR THE FIRST RUN.
```

```
130 23 183 1643Y = 1.4043Y
130 3344Y = (46431) 28446E 061
       VS21=VS2+1
 30 185 133=1,4821
135 357472(103)=S85742
       30 FO 181
 3UNITHCO 021
       IF(IJ.3E.2) GD TD 131
       1344 = 1
1344 = 1

XCHCK = XST(2)

33 173 1CH3Y = 1.4VCH3Y

XCSI = FCA5*AJ(ICH3Y)*FC15

152 1F(XCHCK.3E.XCSI) SJ FJ 151

XCHCK = XCHCK + SPASE2

1344 = 1044+1

33 TJ 152
 151 CONTINUE
       I-PPCI = APRG1
       BETANZCICHEY) = SETANZCIOMM)
     1+(BETAN2(1)44) -BETAN2(1)444))+(x<S1-xC4CK)/SPACE2
       ILM=ICHBY
       X(SI = FCA5+AJ(ILM )+FC15
JRIFE(5+250) ILM-39FAN2(ILM),X(SI
 25G FORMAT(15x+*I=+,13+2x++3314+2=++E14+7+2x++X4SI=++E14+7)
 SENTINCS C11
 131 CONTINUE
       YINT = 0.
       YELON : = PESI EEL CO
       ((PLZI)LA+.1)+(IA++(PLZI)SVATBE) = 1EA
(SAA+(PLZI)LA)+(1A++(PLZI)LA) = SEA
       SRAB2 = SRRT(AB2)
 SEASSIER + JULY = THIY CET
YERONIRA+THIY = THIY
ECNITACE OCCI
       RETURY
       EVD
```

11

```
SUBROUTINE CAVITY (XCC. YCC)
2 THIS SUBROUTINE IS CALLED FROM DXFNEW FOR F(5).
                            DIMENSION CKEX(100) + SKEY(100) + ANSI1(100) + SRI2(100) + SIC313(100)
                             CTTZX+(CD1)+14012 VCIZVICT)
                             COOLDAANCH CECLOXANCE ACTENTACE
                             COMMON YCCC.SBETA2
                              COMMON XIT4(200) +XITN(200) +4NSG2S(200) +SARC2(200)
                             COMMON CAVX(180)+CAVY(180)+BETAB+BETAC+XCCC+NCAV+LP4M+NS2
                            CODIO AUCTO AUCTO CONTRACTOR CONT
                                                                                       SBETA+XX4+ICPI+SARCOD(513)
                              40FFE
                             CONTRACTOR CONTRACTOR AND CONTRACTOR CONTRACTOR AND ACTION OF THE CONTRACT
                             COMMON XSV(7).
                                                                                                                      CLI+ERC+YMY+KM+IFERA+SMSIO(7)+SMSIOO(7)+YMS(7)
                               COMMON PSIZ+LP+SARC(513)+SARCO(513)+LPM+DE
                              COMMON BETAN(513),BETAM(513),IJ,LPK,XII(200),XJJ(200),XCX
                              COSC, EESE, AASA, CRUCRX ROPPEC
                               CCC+EEEB+AAAA NOPPCC
                                                                                                                             2.A5.33.C3.D3.F3AJS(100).43AJS(100).V6AJS
2 X202 IS THE CAVITY END POINT CALCULATED IN SUB. CAVITY.
                            CALL = COS(DELTA)
SDEL = SIN(DEETA)
                            P4I = 3.141592654
                            DD 1 _DA=1.7
                    1 XST(LJA) = YXS(LJA)
                            SCG4 = SGRF(1.+(ST(5))
                             CCC1=4LDG(1.+XST(5))/(2.*PAI)
                             V:4/=30
                            VCAVI=NCAV+1
                            CAVS = (XST(2)-XST(1))/NCAV
                            LEAVE THE LAST POINT OF MOST = C STRONT TRANSPORTED IS A STROUGH MATERIAL PROPERTY FOR STRONG PROPERTY AND SERVED FOR THE STRONG PROPERTY OF THE PROPERTY OF T
                            33 2 (_4 = 1+4CAV1
                            XCA = XST(1) +CAVS* (<LM-1)
REA_ PART JE DHEGA = BETA+ PAI.
                            IF (KLM.EQ.1) GO TO 3
IF(KLM.EQ.NCAV1) 30 [0 10
D----- Colexsia Calculation, Calling of Simi.
                            IF (IJ.3E.34) GD TJ 75
                            43= = 3
                            CALL DESIGNAVS+ NOF+ KCA)
                            ANS IS A SOLUTION FOR ICI(XCI), XCI IS IDENTICAL TO XCA.
                            IF (IJ.E3.27) ANSII(KLM) = ANS
             30 10 76
75 ANS = ANSI1(K_M)
             75 CONFINUE
 J---- 1326xS1) CA_CJ_ATIDN.
                            I=(IJ-3E-34) 30 TO 77
                            1312 = 1
                            CALL IC2(SR+SM+XCA+ISIC)
                            SALA 24 IN OLITICED -- 24 12 ES4 SALAT.

12 (11) EC-27) SKIZ((-4) = 24
                            20 TO 78
              17 SR = SRI2((_M)
              3UVITACO 97
C----- ICS (XSI) CALCULATION-- USE CHEBYSHEV-GAUSS
                            QUADRATURE FORMULA.
                            3°C3 = (XST(1)+XST(2))+.5
                            $455 = (X$T(2)-X$T(1))*.5
                            A31 = (9PC5+1.)/C485
                            A32 = (-8°05+XST(3))/0485
```

C

EK1 = XCA-XST(2)

```
E(2 = (xCA+1+)*(xCA+(ST(1))*(xCA+(ST(3))
     EK3 = SGRT(EK1/EK2)
     E=33 = C435+E<3
     I= (IJ+9E+34) GO TO 33
     SIC3 = 0.
     YELCHOL = PEST 5 CC
     EJ1=(AJCISUM)+A31)+(A32+AJ(ISUM))
     SEU1 = SORF(EU1)
     EF3 = (1.-AU(ISUM))/SEJ1
     EF34 = CH35*AJCISJ4)+3*C5-XCA
   5 SIC3 = SIC3+(EF3-EF33+SART(L+-AJ(LSJ4)++2))/EF3A
     SIC3 = SIC3+PAI/NCH3Y
     SIC3 = SIC3+A_D3((XST(2)-XCA)/C4CA-(ST(1)))+E(3
     If (IU.EG.27) SIC3I3(K_M) = SIC3
     33 TO 81
  30 SIC3 = SIC3I3(K_4)
  31 CONFINUE
   ---IC4(XSI)---
     ALLESCE ESCHARCALE SZUAR-VERZEBED ESC
        IN THE SAME MANNER AS THAT FOR IN IN
        OFSIM3.
     IF(IJ.3E.34) $0 TO 32
     ==C5 = (XST(3)+XST(2))++5
     F405 = (xST(3)-xST(2))+.5
     441 = (FP25+1.)/F405
     A42 = (FPC5-XST(1))/F4C5
     SIC4 = G.
     DD 7 ISUM= 1.NCHBY
     RA = (35TAV2(ISJ4) + 24I) + (1 + 4J(ISJ4))
     R3 = (AJ(ISJM)+A41)+(AJ(ISJM)+A42)
     SRS = SURT(RB)
     EF2\45 = 15
     RD = F4C5+AU(ISUM)+F9C5-XC4
   7 SIC4 = SIC4+RC/RD
     SIC4 = SIC4+PAI/NCHBY
     IF(IJ.E3.27) SIC4I4(E_4)= SIC4
     30 TO 33
   32 SIC4 = SIC4I4(KLM)
   33 CONFINUE
     IF (IJ.EG.27.AND.KL4.EQ.2) #RITE(6.55) ANS.SR.SIC3.SIC4.KLM
  A+<L4=+, I4)
  10(XSI) = 1/2K3 ALREADY CALCULATED.

JJ2 = 038(4_F41+54444)/008(KST(5)+64444)/XST(7)
     SC = (-AHS/PAI-SR+(CCC1-ALOB(JJ2)/PAI)+SIC3
    1-SIC4/PAI)/EK3
   30 TO 25
3 GC = 35 A3+PAI
     30 TO 25
  13 3C=BETAC+PAI
2 BETAS ON BETACK BOOM ANGLES AT B AND CO MUST BE SPECCIED IN COMMON.
   35 CONTINUE
     XXS = XCA+CDEL
     YYT = XCA-XST(4)+SDE_
     YYT2 = YYT ++2
     XXU = (ST(+)+CDEL
     XXU2 = XXJ++2
     413 = YYT2+4XJ2
```

4.1

```
SUBROUTINE G2 (XS2+452+IS2)
              NCIENTELC
                                            xST(7), 4121S(200), x1225(200), x123S(200), x124S(200)
              CATHER . JOHN COMME
              COS)SORAZ+(CCS)ZSZZVA+(OCS)V71)+(OCS)P71x VCPPCC
              224+PP4-VACK-222X-24-25-35-400)-35-40-400-4000-4020-4020-404000
              COOL) SHATER (DE1) SHATER (DE1) HATER (PENDIN - SALEZI (GOL) LA VEPPE
               CPPACELLATION CARECTARISCANALA PALTALE
                                           SEETA . XX4 . ICPI . SARCOD (513)
              KOPMOD
              COLORALS AND COLORA COL
                                                           DIE, ERC, YYY, XM, ITERA, SXSIO(7) + SXSIOD(7) + YXS(7)
              COMMON XSV(7).
               234404 PSIZ+LP+SARC($13)+SARC3($13)+LP4+DE
              234404 BEFAN(513)+8EFA4(513)+LJ+L2(, KII(200)+(JJ6200)+KJK
             INCLUDES [21(XS2) TO [24(XS2).
              . SZARSETY I TO VOITLE CE ST. ZE SEA - 12x EL SER
              33 1 137=1+7
         1 xST(IAP)=YXS(IQP)
              PAI = 3.141592554
              CCC1=ALOG(1.+xST(6))/(2.*PAI)
              I= (IJ.3E.47) 30 F0 100
----[21(*SI)----
              THE SAME INTEGRATION AS THAT IN
              SUBROUTINE CAVITY FOR SCIKSI)
              10= = 3
              CALL DESIGNATIONS (S2)
              XI21 = ANS
              I=(IJ_*IJ_*IJ_*A0) \times IZ1S(IS2) = \times IZ1
:---- [22(xS[)----
              JSE THE SAME SUBROUFINE ICE AS
              JSED LY CAVITY HITH LSIC=L.
              ISIC=1
              CALL [02(SR+S4+XS2+[5]0)
              x122 = SR
              WOTE THAT SH IS DUMAY WARTABLE.
              I^{\#}(IJ_{*}IJ_{*}) \times II22S(IS2) = KI22
       --123(XSI)----
              USE CHEBYCHEV-GAUSS BUADRATURE FORMULA
                  IN EXACTLY SIMILAR MANNER TO THAT IN
                     JFSIM3 FOR I3.
              x123 = 0.
              3 25 = (xST(1)+xST(2))+.5
C435 = (xST(2)-4ST(1))+.5
              A31 = (8PC5 + 1a)/C485
A32 = (-8PC5 + XST(3))/C485
              YEHON . I SUM = 1.NCH3Y
               TAL = 1.-AJ(ISJ4)
              mA2 = (AJ(ISU4) + A31) + (A32-AJ(ISU4))
              S4A2 = SQRT(HA2)
F3I3 = HA1/SHA2
              SZX-SCHE+(PUZI)LA+EEPC = EIAE
         2 4123 = X123+F313/F3413
              XI23 = XI23+PAI/NCH3Y
              I = (IJ.E0.40) x1235(IS2) = <123
              USE CHEBYCHEV-GAUSS BUADRATURE
                    TOTALLA SY ASSUME ALLERCT
THE KERNEL FONG IS SHOTH.
```

```
4J = (xs2+1.)*(xs2-(sf(1))*(xsf(3)-(s2))
    AV = XS2-XST(2)
    HE = SORT(HU/HV)
    F2C5 = (XST(3)+XST(21)+.5
    =4C5 = (xST(3)-xST(2)) -.5
    A41 = (=>C5+1+)/F4C5
    A42 = (FPC5-XST(1))/=1C5
   x124 = J.
    DO 10 ISUM = 1. NCH3Y
    TPA1 = AJ([SU4)+A41
    TPA2 = AJEISU4)+A42
    STP = SAKT(TPA1+TPA2)
    FAT = (38FAV2(ISJ4)+24I)+(1.+AJ(ISJ4))/STP
    BSTANZ IS CHEBY-GAUSS VERSION FOR BITA ON THE SECOND ARC.
    F44 = F4C5+4J(ISJ4)+F9C5-KS2
    ST2 = SGRT(1 - AJ(ISJ4) + 2)
    F49 = F4C5 +812+(3E1442(IS2 )+PAI)/+d
10 XI24 = XI24+(#4T-#431/#4A
    YELDFILAGE XIZA PAI/NCHBY
    SETANZ IS USED FOR STAPSONTS RULE.
    xLG = ALOG((XST(3)-XS2)/(XS2-XST(2)))
    IS2 IS TRANSFERRED FHROUGH 32-ARGUMENT.
    x1242 = xL3+(BETAN2(IS2)+PAI)/Hd
    x124 = x1241+x1242
    I# (IJ. EG. 40) XI245 (IS2) = XI24
    30 TO 161
130 x[21 = X[215([S2)
    x122 = x122S(1S2)
    X123 = X1235(152)
    X124 = X1245(152)
131 x524 = -x[21/241-x[22
    XS23 = CCC1-ALDS(CDS(4LFA1+SAMMA)/C)S(XST(5)+SA4MA)/XST(7))/PAI
    x520 = x523+x123
    1827 = -x124/3AI
    A32 = (XS2A+XS2C+XS2) +Hd
    IF (IJ.E2.27.AND.IS2.E3.2) #RIFE(5.52) xI21.xI22.xI23.xI24.IS2
    IF (IJ.EG.27.AND.IS2.EQ.10) #RITE(6.52) XI21.XI22.XI23.XI24.IS2
IF (IJ.EQ.27.AND.IS2.EQ.30) #RITE(6.52) XI21.XI22.XI23.XI24.IS2
52 F3R4AT610(+----11+12+13+14 )F F(5) AR---++4(51457+21) 92K+
   4 -152=++14)
    RETURN
    END
```

• •

```
SUBTOUTINE RMENT (SR.SM.MIQ)
   DIMENSION XSTCT)
   COMMON XIT4(200),XIT4(200),4VSS2S(200),SARC2(200)
    COMMON CARXCIODISANTCIDONIBERABIBERACIACONOAVILPMMINSE
    COCTSSANTER COCTSSANTER, CCCTSVATER, VCHCARACTOR CCCTSCA VCPPCC
   EDAMON FLAPANODELTAOJGAPOALFALOGAMMA
CDAMON SBETAOKKAALCPIOSARCODKETS
COMMON IDULOXAOXBOXCOTANGOEPOYCOYROJBIGSOXLBIGSOBIGSOSMALSODSS
CDAMON XSV(7)0 CLEOERCOYYYOXMOITERAOSXSID(7)0SXSID(7)0XS(7)
CDAMON PSIZOLPOSARCKETS)0SARCOKETSORCO
    COMMON BETANGS131+85TAMG5131+13+L24+XII(200)+XJJ(200)+XJX
    COSO+EESE+AASA+CVLLRX VCPPCO
    13440v AAAA,8385,0001,48,88,08,08,T3AUS(100),464US(100),NGAUS
   P41 = 3.141592654
   LE (ICPI-EG-0) GO TO 10
   33 12 I5 = 1.7
12 \times 31(15) = \times 31(15)
   30 TO 11
10 33 1 15 = 1.7
 1 \times ST(IS) = Y \times S(IS)
11 CONTINUE
   XX1 = XST(4)+6IN(GE_TA)
   YY1 = XST(4) + CCS()E_TA)
   YY12 = YY1**2
   C35 = (XST(2)-XST(1))+.5
   305 = (XST(1)+XST(2))+.5
   A31 = (805+1.)/085
   A32 = (-625+X$T(3))/235
   BM18 = (XST(1)-1.)+.5
   3215 = (X$T(1)+1.)*.5
   A11 = (3M15-XST(2))/3215
   A12 = (8M15-XST(3))/3-15
   FPC5 = (XST(3)+XST(2))++5
   FMC5 = (xST(3)-xST(2))+.5
   A41 = (=P25+1.)/F4C5
   A42 = (FPC5-XST(1))/F4C5
   I=(MIG.EG.4) 30 10 4
I= (MIG.EG.3) 50 TO 3
   S OT CC (S.C3.21M) =1
SMITHORELS WI CETABLOLAG WCAERLA ERA (INLA
        TFINTLE AND STORED IN COMMON AREA.
   54=C.
   33 20 ISU4 = 1.4C48Y
   3X1 = 1.-4J(15U4)
   GY1 = (AU(ISU4)+A31) +(A32-A)(ISU4))
   S341 = $347(3/1)
   ==3 = 3X1/SGY1
   FX1 = 095+4J(ISJM)+305
FX2 = FX1-KX1
   *x22=*x2++2
   FX3 = FX22+YY12
   FF31 = FX2/FX3
   ==32 = YY1/=X3
   SR = SR+F=3+FF31
20 34 = 34+F=3+FF32
   SR = SR+PAI/NCHBY
   S4 = S4.PAI/NEASY
   30 TO 1000
```

C

```
3 CONTINUE
     I= (IS4A4>.EQ.1) 30 FJ 100
     SO THAT CHERYSHER GRUSS FORHULA CAN BE USED AS BELOW.
      51 = 0
      54 = 0
     Y5F2V+1 = PU21 05 CC
11A+(RU21)LA = 1172
      ST12 = AUCISUT)+A12
      F(1 = BETANCISUM)+SERT(ST11/ST12)
     1XX-21PE+(PE21)LA+219E = 1PU
      Jv12 = Jv1 • • 2
      JN13 = UN12+YY12
      =<11 = JN1/JN13
     FK12 = YY1/UN13
      34 = 34+F(1+F411
   30 S4 = S4+F(1+F(12
     SR = SR.FAI/NCHBY
     S4 = S4.241/4243Y
      30 TO 1000
 STAILINCS CET
      THIS IS THE CASE THAT THE FOIL HAS ROUNDED LOES
      43= = 1
     XCA = 3.
     CALL DESIGNER, NOF . XCA)
2. (24 IS 2J44Y----DVLY JSED FOR F(5) IN DXFNEW.
     N 3 F = 2
      CALL DESIMI(SM.NDE. CDA)
      30 TG 100G
    3 CONFINUE
      JSE CHEBYSHEV-GAUSS FORMULA SINCE BETA
      IN THIS REGION IS SHOOTH.
     SETAN2 (ISUA) ARE ALREADY CALCULATED AT TRINTLE.
     SR = 0.
      34 = 5.
      DO EC ISUM = 1.NO48Y
      "SL = (351442(ISU4)+341)+(1.+4)(ISU4))
      PS4 = (AJ(ISJ4)+441)+(AJ(ISJ4)+A42)
     SGPSM = SGRT(PSM)
      F:4 = 251/33254
     PSN = FMC5+AJ(ISUM)+FPC5-XX1
     25 N2 = 25 V++2
      F=41 = PS4/(PSN2+Y112)
     ##42 = YY1/(PSN2+YY12)
      34 = 34+F=4+F=41
      SH =SM+FF4+FF42
   SEVITIVES 86
      SR = SR + PAI/NCHBY
      S4 = S4+PAI/NCHBY
      33 TO 1000
    SUMITACE #
      KOA IS DUAMY. DALY USED FOR LOS IN F(5)
      MCA = G.
     1312 = 0
      SUBROUTINE ICS IS ALSO USED IN F(5).
      DALL IC2(SR.SH.XCA.ISIC)
 VACTOR DEDI
     END
```

Contract to the second second second

```
SUBROUTINE SHAPE (X.Y. BETA. IS112)
      COMMON/FREECAV/XFREEC, YFREE
      SATER . COS . SETAR
      C34434 XIT4(200) +XIT4(200) +ANSG2S(230) +SARC2(200)
      COMMON CAYX(100)+CAYY(100)+3ETAB+3ETAC+XCCC+NSAV+LP44+NS2
      23M43N AU(100}+I54AR2+NC46Y+BBTAN(130)+BBTAN2(100)+BETAN2(100)
      COMMON FLAPANADELTAADGAPAALFA1AGAMMA
      VOPECO
                  SBETA, KKM, ICPI, SARCOD(513)
      COMMON XSV(7)+
                         CLE.ERC.YYY.XM.ITERA.SXSIG(7).SXSIDO(7).YXS(7)
      COMMON PSIZ+LP+SARC(513)+SARCO(513)+LPM+DE
      COMMON BETAN(513) + BETAN(513) + IJ+LPK+ XII(200) + XJJ(200) + XOX
      COSCHEESE ALASA GULLAX NOPPEC
      CD4404 AA44.8388-CCCC.A3.88.C3.D8.F3AUS(100).4GAUS(100).NGAUS
      PAI =3.141592653
      X2=X++2
      X3=X++3
      xs=sarr(x)
      2 * - X = K
      #FREE2=XFREEC++2
     XFREES=XFREED++3
XFREES=SQRT(XFREED)
      XFREE+=XFREED+XFREES
      X22=.2**2
      X23=+2**3
      x25=$3RT(.2)
     x2#=+2* x2$
      432=+3++2
     x53=-8++3
      13S=S2RT(.8)
      E. . SEX = HEX
DING MUST CHECK TO SEE IF WE ARE GOING TO CALCUATE THE FOP PART DION FRE BOTTOM PARTS OF FOR WE TRANSFER TO END MALE OF ROUTINES
I [3112 = 3 13 JSED FOR CALCULATIONS OF JPPER FOIL PROFILE
      If(IS112.E3.1) 30 () 30
     IF (IS112.E3.3) SO TO 80
     I= (X._E..2) SO TO 15
     IF (X-LE--3) 30 TO 20
     IF (x.37..3) 34 T3 25
   15 Y=A2AA+X+323B+X2+C2CC+X3
      Y0x=AZ44+3286+2.+x+0200+3.+x2
      CXCYDVATA=ATEE
      30 TO 50
   23 Y=RAAA+(4./3.+X+8./3.+XH-4.+X2)+8333+X+CCCC+XS
      YJX=AAA4+(4./3.+8./3.+1.5+X3-3.+X)+3383+.5+CCCC/XS
      CXCY) NATA=AT38
      23 70 50
   25 Y=A3+38+X+C8+X2+09+X3
      Y3x=99+2.+26*x+5.+03*x2
      (XCY)RATA=AT3E
      30 TO 50
C FHIS 2ND HALF OF THE ROUTINE IS FOR CALCULATING THE UPPER HALF
   36 IF (IS112-EG-3) GD TD 70
```

```
IF (XFREED+LE++2) 60 [3 35
    70 CONTINUE
    IF (X-LE -- 2) GO TO 35
    IF (X.LE...B) 30 TO 50
I= (X.GT...B) GO TO 55
 55 IF (IS112-E3-3) 33 F3 80
    R1=YFREEC-A2AAU+XFREEC-B2BBJ+XFREE2-C2CCU+XFREE3
    33 FO 51
30 R1=6.
 31 CONTINUE
    IF (x.37..2) 30 TO 43
    Y=A2A4J+X+3283J+X2+0200U+X3+R1
    Y) R= A2A A J+2. + 5255 J+(+3. + C2CC J+ X2
    IAS-CXCYDALAEATSE
    30 TO 50
 +0 Y2=4244U++2+5288U+X22+C2CCU+X23+R1
    RZ=Y2-AAAAJ*(4./3.*.2+6./3.*X24-4.*K22)-8333U*.2-3C33U*X2S
    IF (IS112.EG.3) R2=).
    I= (x.31..3) 30 T3 45
    T=AAAAJ+(4./3.+K+5./3.+K4-4.+K2)+333J+K+CCCCJ*KS+R2
    YOX=AAAAU*(4./3.+8./3.*1.5*x5-6.*x)+BBBBU+.5*CCCU/XS
    IAS-(XCY)NATA=ATSE
    30 TO 50
 15 Y3=48J+86J+.8+C8J+x82+38J+x83+R2
    R3=Y3-A3U-33U+.3-C3J+X32-D3J+X33
    I= (IS112.EQ.3) R3=J.
45 Y=ASJ+55J+<+C5J+X2+J3J+X3+33
    YCx=85U+2.*C8U*x+3.*38U*X2
    JAC- (XCY)VATA= ATE
30 TO 50
50 IF (IS112.E4.E) 30 FO 90
    R2=YFREEC-AAAAU*(4./3.** XFREEC+8./3.** XFREE4-4.** XFREES) +3338U*XFREEC
   1 -COCCU-XFREES
    33 [3 31
30 R2=3.
 31 CONTINUE
    I= (X.3T..8) GC TO 45
    Y=AAAAJ+(4./3.+x+3./3.*x+-4.*x2)+3633J+x+CCCCJ+KS+R2
    YDX=A444U*(4./3.+8./3.*1.5*4$-8.*()+8688U+.5*CCCCJ/(5
    IAS- (XCY)MATA=ATBE
    33 F3 5ú
55 1F (IS112-EQ-3) GO TO 100
    RESTARTED - ABU-BBU+ XFREEC-CBU+ XFREE2-DBU+ XFREE3
    30 TO 101
130 33=3.
INT CONFINE
    30 TC 46
SO RETURN
    END
```

The second secon

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```
CYC. X2. ECY. ECX) DYDX 3NITLCFBL2
  C04404/JPPER/A2AAU,323BU,C2CCJ.AAAAJ.BBBBJ.CCCCCJ.A8J.BBJ.C8U.38U
  <<===X
  x<2=x<++2
  x43=x4++3
  XKS=SQRT(XK)
  X < h= X < * X K S
  12=5
 IF (CX.LE..2) GO TO 3
IF (CK.LE..3) GO TO 3
  IF (Cx.GT..8) GO TO 5
3 =1=A2AAJ+X<+B233J+X<2+C2CCJ+X<3
  F2=424AU+2.#8268U+XK+3.*C2CCU+XK2
  F3=44-0X
  FXK=F1+(F3/F2-CY)
  21==2
  32=(31+=3*(2**3253J+5**0200J*K())/01**2
  JFXK=31+02
  DIV=FXK/DFKK
  XK=XK+DIV
  1 = 1 = +1
  Z=ASSIDIV/X()
  1f((Z.LE..000001).OR.([P.E3.20]) 50 TO 6
  33 13 3
4 F1=AAAAU+(4./3.*X4+5./3.*XK4-4.*X42)+8888U+XK+CCCCU*XKS
  F2=AAAAU+(4./3.+6./3.+1.5+X<S-8.+<<)+8888J+CCCCJ+.5/X<S
  F3=XK+CX
  Fx<=F1+(F3/F2-CY)
  01=F2
  D2=(D1-F3+(AAAAJ+(8./3.+1.5+.5/XKS-3.)-CCCCJ+.5+.5/XKH))/D1++2
  JFK(=31+32
  DIV=FXK/DFXK
  IP=IP+1
  Z=ABS(DIV/X<)
  IF((Z.LE..000001).DR.(IP.EB.20)) 30 TO 6
  50 TO 4
5 F1=48J+98J+XK+C8U+X<2+D8U+X<3
  F2=38J+2.*15U+X4+3.*33J+X42
  =3=xK-CX
  FXK=F1+(F3/F2-CY)
  31=52
  J2=(J1-F3+(2.*C8U+6.*J5U*X<))/J1**2
  JF44=31+02
  DIV=FXK/DFXK
  VIC->X=>X
  IP=IP+1
  C>X\VIC)2EA=S
  IF((Z-LE--000001)-DR-(IP-EG-20)) 30 TO 6
  30 FO 5
5 X23=X4
  IF (CX.LE..2) YCB=A2AAU+XK+3235J+XK2+C2CCU+XK3
  I=(CX-LE--B) YCB=AAAAJ+(4-/3-+X<+B-/3-*XKH-4-+X<2)+BBBJ+XK
 x +CCCCU+xKS
 IF (C(.GT..8) YCB=A8J+88J+X<+C8J+X<2+D8U+X<3
  RETURN
  CVB
```

127

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```
SUBROUTINE ARCLEN(XSS+XL+XH+IS112)
  COMMON YCCO+SBEIA2
  334434 XIT4(200) +XIT4(200) + A 48328(230) + SARC2(203)
  COMMON IDUL. XA. XB. XC. TANG. E2. YC. YR. JBIGS. XLBIGS. BIGS. SMALS. DSS
                      CLEVERCYTY XMVITERA SESTOCTO SESTOCTO YXS (7)
  COMMON XSV(7).
  234434 PSIZ+LP+SARC(513)+S4RC3(513)+LP4+DE
  134404 BETAY(513)+31[44(513)+[J+L2K+XII(20C)+XJJ(200)+X3X
  33440N XRJJNJ,4244,3233,0203
  COMMON AAAA.BBB3.CCCC.AB.BE.CB.DB.TJAUS(100).4GAUS(100).NGAUS
DIMENSION T(100).4(100).=(100)
  N=NGAJ$
  33 5 J=1.V
  T(J)=F3AUS(J)
5 a(J)=aGAUS(J)
1 534=0.
1 337-00

20 2 J=10V

2011 F02(F(J)0F(J)0X.00XH0IS1I2)

2 SJM=SJM+W(J)0F(J)
  PLZ=ZZK
  RETURY
  END
```

..

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CITCION X ... X . TO TO TO THE TOTAL STREET
      CDM4DV/UP267/4244U.3233U.C2CCJ.4444J.833EJ.CCCCJ.448J.8BJ.C6U.48A
       SATBER COOP VCPPCS
      23443V XLT4(230)+X1F4(233)+AVS32S(230)+SARC2(203)
     COMMON CAVACTOD: CAVY(100) + SETAS + SETAC + XCCC + NDAY + LFMM + NS2
COMMON AU(100) + ISHAR? + NCHSY + SETAN(100) + SETAN(2(100) + SETAN(2(1
      COMMON FLAPAN, DELTA, DSAP, ALFA1, SAMMA
COMMON SETA, x (4, ICPI, SACCO) (513)
     COMMON IDULAXAXBAXCATANGAEPAFCAYRAJBIGSAKLBISSABIGSASMALSADSS
COMMON XSN(7), CLEVERCAYYYAKMAIFERAASXSIO(7)ASXSIOQ(7)AYXS(7)
COMMON PSIZALPASARC(513)ASARCD(513)ALPMADE
      COMMON BETAN(513)+95T4M(513)+1J+LPK+XII(200)+XJJ(200)+XOX
      CCCO+EESE+AASA+GVLCAX VCPPCC
      SUADY * COOL) SUACE, COOL) SUACT * 8 C * 60 * 68 * 62 COO COOL) EEEB * AAAA POPMCO
      I[23V[=1
      X==(X+-XL)+T++5+(4H+(_)++5
      SXP=SERT(XP)
      ( + 2 = X + + 2
      1°(xP.3E..5) 30 TO 1
      IF (XP.LE..2.AND.IICDNF.E3.1) 30 TO 4
      IF(xP+LE++2) 30 TO 3
      -1=(4./3.+4.+5x2-4.+x2)+4444
      22=3833
      P3=+5+CCCC/SX?
     IF (ISII2@E4@1) P1=(4@/3@+4@eSXP=4@eXP)+AAAAU
IF (ISII2@E2@1) P2=3353U
      I= (IS112.53.1) P3=.5+0000J/SxP
      30 TO 2
3 -1=-.5*SQT[(2.*XR)]/SXP+42AA
     22=3233*$(2*1.5
     P3=2.*C2CC*XP
      IF (15112+53-1) P1=-+5+53RT(2+*KRJJND)/SXP+42AAJ
      I= (IS112.50.1) P2=3238U*Sx2*1.5
      I= (IS1I2.E2.1) P3=2.*C2CCJ*x2
      33 TO 2
SUVITIVES 4
     21=4544
     P2=2.+5283*XP
     P3=3.*1201*XP2
      I= (IS112.23.1) P1=424AU
      1= (15112.53.1) P2=2.+8295J*x2
      IF (IS112.EQ.1) P3=3.+C2CCU*XP2
      $3 FD 2
1 -1=35
     P2=2.+C8+#P
      93=3.#35*XP2
     IF (IS112.62.1) P1=33J
IF (IS112.62.1) P2=2.**C8J*x?
IF (IS112.60.1) P3=5.**O8U*x?2
2 34231+22+33
      342=34++2
      P5=1.+P42
     525=5327(25)
      F=(XH-XL)+$P5+.5
     RETURN
     FVC
```

```
SUBROUTINE MOSEC(A+3+ER1+ER2+X+J+XLPA+IS1I2)
     J = 0
     41=A
     X2=3
 4 J=J+1
    J=J+1

IF(J-SE+800) 50 TO 8

CA__ FARC(PFX1+XLPA+(1+IS1I2)

CAL_ FARC(PFX2+XLPA+(2+IS1I2)

X3=X1+(X2-X1)+PFX1/(PFX1-PFX2)

CA__ FARC(PFX3+XLPA+X3+IS1I2)

IF(PFX3)1+2+3
 1 X2=X3
     X1=X1
     I=(4-3)10+10+11
10 Y=X3-ER1
IF(Y=E+0+) Y=0+
3) FD 12
11 Y=x3+ER1
12 CALL FARC(PFY+X_PA+YrIS112)
IF(PFY) 5+2+2
 3 X1=X3
     42=42
IF(A-3) 20+20+21
20 Z=X3+ER1
     GO TO 22
21 Z=X3-ER1
22 CALL FARC(PFZ+XLPA+Z+IS112)
I=(PFZ)2+2+5
 5 33 13 4
 2 PP= ABS(PFX3)
     [=(>>-ER2) 5.5.4
 6 X=X3
30 TO 7
 8 WRITE(6+9) J
9 FORMAF(1x+24J=+13)
    3132
 7 RETURN
END
```

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```
SUBROUTINE DETERM (A.V.D)
DETERM REVISED 02-28-73
REAL M
      DIMENSION A (50,50), SAVEA(50,50)
      24 CT CB(1 .62. V) 71
      C = 1.
      V = V
     NA 1 = 1 6 CC
20 3 1 = 1 + NA
  (L.I)A = (L.I)A3VAE F
      < = 1
     30 TJ 13
     \mathbf{x} = \mathbf{x} + \mathbf{1}
 13 1 = ( + 1
      33 T3 17
     1 = 1 + 1
J = (
      ROW INTERCHANCE
     30 T.3 23
     1 = 1 + 1
 2.2
 23 SAVEKU = SAVEA(K.J)
     SAVEA((+J) = SAVEA(+J)
SAVEA(L+J) = SAVEKJ
     1= (1 "NE" NAD20 12 55
28 1 = ( + 1
50 TO 31
50 I = I + 1
     BLVITVES
31
     IF (SAVEA(K+C) .EQ. 6.) SO TO 48
4 = SAVEA(I+C) / SAVEA(K+C)
                                                                                  02-20-73
     SAVE4(I+() = 0.
      J = < + 1
     30 TJ 36
 35 J = J + 1
 36 SAVEA(I+J) = SAVEA(I+J) - 4 + SAVEA(K+J)
     IF (1 -NE- NN190 TO 35
IF (1 -NE- NN190 TO 30
IF (< -NE- (NN-1):);) TO 12
     3 = 1 ·
     3J 45 I = 1.444
      J = I
     (L.I)ABVAR + C = C
     IF (ABS(3) .LT. 1.2-36) 30 TO 46
     SUVILIVE
45
     ) = ) + :
     RETURN
    3 = 4(141)
     RETURN
     3 = 3.
     #RITE (6+51)
     FORMATC//5x+terror MESSAGE FROM DETERMET/
   1 SKOTATTAT IS SINGULAR DEFERMINATE SET = 3.07 //)
     RETURN
     CVE
```

```
SJBROJTINE 363ETA(X(.R3ETA.LS112)
: THIS SIVES BETACK(XSI)).
       COMMON YCCC+SBETA2
       COMMON XITH(200)+XITH(200)+445328(2)0)+SARC2(200)
       COMMON CAVXEIDOD .CAVYEIDOD .BETAB.BETAC.XCCC.NCAV.LPMM.NS2
       COLISCHATER (DOLISCHATER (OCLINATER YERON FRANKISCHOCK PCPCC)
COLICA FLANCISCHOCK PARAMETER (ACPCC
       COMMON SBETA+XX4.ICPl, SARCOD(513)
COMMON IDJL+XA+XB+XC, FANG+EP+YC+YR+JSIGS+XLBISS+316S+SMALS+DSS
       COMMON XSN(7). CLE.ERC.YYY.KM.ITERA.SX:
CJM4DN PSIZ._P.SARC(513).SARCJ(513)._PM.DE
                             CLE. ERC. YYY. KM. ITERA. SXSIC(7) . SXSICC(7) . YXS(7)
       COMMON BETAN(513)+SETAN(513)+LJ+LP(+X11(200)+KJJ(200)+XJX
       COSO. EESE, AASA, CVLCAX VCPPCO
       20440v AARA, 3352, 2002, A3, 33, 08, 08, T3AUS(100), JGAUS(100), NGAUS
       ER1=5.E-3
       ER2=5.E-3
       IF(IS112.E4.1) 30 TO 20
1 IS112=0 FOR S1.
         1 FOR $2.
       _344A=_PM-1
       344_3=$480(_2)
       IF(LP.E2.LPM) SO TO 10
       DSS=SARC(_P)-SARC(LP+1)
       XLPA=XX
       33 TJ 21
   20 SHALS=SARC2(LP)
       I=(LF.EG-1)30 TO 11)
       X _ 3 4 = X X
       DSS=SARC2(LP)-SARC2(LP-1)
   21 CONFINUE
       X1A=XLPA
    4 X13=X14+.031
       CALL FARC(FAR+X_PA+(13+IS1I2)
       IF(FAR-LT.C.) 60 TO 3
       KIA=KIS
       30 TO 4
    3 CALL MOSEC(X1A+X18+ER1+ER2+(X+JII+X_PA+IS112)
30 TO 11
   10 Xx=0.
       33 TC 11
  113 XX=XCCC
   11 34.1 $44PE(XX+Y+R3EF4+1$112)
       RETURN
       EVO
```

```
SJROJTINE =ARC(FAR, 4_PA+413#IS112)
COMMON YCOC+SBETA2
COMMON YCOC+SBETA2
COMMON XIFM(200)+XIFM(200)+ANSG2S(210)+SARC2(200)
COMMON CAVX(100)+CAVY(100)+BETAB+BETAC-XCCC+NCAV+LPMM+NS2
COMMON CAVX(100)+ISAR2+NCHBY+BATAM(1)0+BBTAV2(100)+BETAV2(100)
COMMON CAPAN-SELTA+JAPAN-FARAMA
COMMON SBETA+X+A+ICP1+SARCD(513)
COMMON SBETA+X+A+ICP1+SARCD(513)
COMMON CO
```

7.0 LISTING OF PCASLDW

```
PRUGRAM POASLOW(INPUT.OUTPUT.TAPE5=INPUT.TAPE5=OUTPUT.TAPE7.TAPE1)
С
  NCNLINEAR PARTIALLY CAVITATING CASCADE CALCULATIONS.
3 5/17/1578 PROGRAMMED BY C. FURUYA.
3----PROGRAM PEVISED FOR FIXED CAVITY LENGTH VERSION ON 9/15/78.
            OPEN WAKE MODEL
                                 (8/16/1979)
C THIS MODEL USES TWO STAGE WAKE (10/3/1979)
      DIMENSION Y8E(8) + XZ(8) + BETA VO(513) + BETA MO(513) + BETA C2(100)
      DIMENSION SXSI(8) + XXX(513) + CP(513)
      DIMENSION FL(200),FD(200),CP2(101),XXX2(201),FL2(105),FD2(110)
      COMMON/FOILEND/XXDD+YYDD
      COMMON /CVTYL/CAVLEN+EIGS2
      COMMON/FREECAV/XFREEC.YFREEC
      COMMON/DELTAD/BELT(5+5)
      COMMON YCCC+SBETA2
      COMMON XITH(200) +XITN(2.0) +ANSG2S(200) +SARC2(200)
      COMMON CAVX(100) + CAVY(100) + SETAS + BETAC+XCCC+NCAV + LEMM+852
      COMMON AU(100) - ISHAPP - NCHEY - BETAN (100) - BETAN 2 (100) - EETAN 2 (110)
      COMMON FLAPAN. DELTA.DSAP. ALFAI.GAMMA
COMMON SBETA.XXM. ICPI.SARCCO(E13)
      COMMON IDUL XA +X6 -XC - TANG - EP - YC - YR - JEIGS - KLEIGS - BIGS - SMALE - ESS
      COMMON XSI-(E).
                           CLE.ERC.YYY.XY.ITERA.SXSIO(8).SXSICC(8).YXS(8)
      COMMON PSIZ+LP+SARC(513)+SARCO(513)+LPM+DE
      COMMON BETAN(513)+PETAM(513)+IU+LPK+YII(200)+XUU(200)+YCY
      COMMON XROUND.AZAA.BZBB.C2CC
      COMMON AAAA,8882,0000,42,83,00,000,TSAUS(110),AGAUS(100),NGAUS
      COMMON/SPC/ESPACE
      COMMON/TAU1/UTAU
S BETAN ----FOR ARC I FOR PERULAR INTEGRAL.

C BETAN IS FOR INTERPOLATED VERSION OF BETAN.

C BETAN2 FOR EQUALLY SPACED INCREMENT FOR ARC 2.
 SSTAND FOR CHESYCHEV- GAUSS VERSION OF SETAND.
      P4I=3.141592653
      FE40 (5+ 798) UTAL
 IF UTAGET LINEAR COMES OF VELS FOR THAT OF FIRST WAMES UTAGET LINEAR COMES OF PRESSURE FOR THAT OF FIRST WAKES
     JT40=1
      READ(5+795) MSAUS
      NG AUS1=NRAUS+1
      NV42=434US/2
       V54352=" \V2+1
      PEAD(5.560) (TGAUS(I).I=1.GAUS2.NGAUS)
      READ(5.567) (AGAUS(1).I=NGAUS2.NGAUS)
      DC 26 IG=1.NN6.2
      TGAUS(IG)=+TGAUS(NGAUS1-IG)
   26 #SAUS(IG)=#SAUS(NSAUS1+IG)
      ARITE(5.551) (TGAUS(I).I=NGAUS2.NGAUS)
       write(6.552) (wgaus(I).I=Ngaus2.Ngaus)
  560 FORMAT(4F20-10)
  551 FORMAT(1X++T(I)=++1^(F10+5+1x))
      READ (5.590) XXM
      00 589 IDELTA=1+8
  589 READ (5.59.) (DELT(105LT4.1).1=1.0)
  562 FORMAT(1x+++(1)=++1 (F17+6+1x))
```

```
COACHT DEED COARE
      READ(5,560) R.AAAA.BBBB.CCCC
      READ(5,561) A9+86+C6+36
      READ(5,560) XRUUND,4244,8285,0200
READ(5,560) AAAAU,6888U,0000U
      REAC (5.550) A8U.68J.C8U.C6J
      READ (5.55() A2AAU.5238U.C2CCU
      READ(5.795)
                           VCHBY
      REAC(5.1321) SBETA .SFETA2.SF4.EETA3.BETAC
      READ(5.551) LPMS.LPKS.LPM2.IFLAG.IFEAD.ISHARP
      READ (5+201) NITTR+MSTOP+MAXIT+NHK
      READ(5+262) AL IS+GAMMAS+SCLIS+
                                            CAVLES
      READ(5,229) DE,06,07
C CAVLEW IS A CAVITY LEMSTH SPECIFIED.
      DD 592 IDELTA=1.8
  592 WRITE (6.591) (CELT(IBELTA-I).I=1.6)
      #RITE(6+6553)
 5553 FORMAT(1H1)
      READ(5.6666) ESPACE
 SESE FORMAT(F10.5)
       ARITE(5,6667) ESPACE
 6667 FORMAT(1x+///+1x++ESPACE=++F5+2+///)
      walth(6,5551) BETAE+BETAC
      ARITE(6.565) R.AAAA.SEBE.CCCC
      ** ITE(6.566) A8.88.08.08
      #RITE(6.567) XRCUND,4244.6255,0200
      ARITE (5.523) AAAAU, 3358U.CCCCU
      #RITE(6,524) A6U,864,364,064
      *RITE(6+825) A24AU+8285U+C2CCU
      ARITE(6,1229) LEMS, LPKS, SEETA, IPEAD, NCHEY
      *8 ITE(6 + 1324) DE+DG+DF+SF4
      w=ITE(6+1521) SEETAR
  523 FCHMAT(20), *AAAA4=*, F10.6,2x, *5659U=*, F10.6,2x, *CCCCU=*, F10.6)
  524 FURMAT(25)++A3U=++F17+6+2)++3U=++F17+6+2X++C3U=++F13+6+2X++D3U=++
     1 =11.60
  525 FCPMAT(27x+*A2440=*+F10+6+2Y+*52580=*+F10+6+2X*C2CCU=*+F10+6)
  590 FORMAT (6F10.6)

591 FORMAT (10%, +DELTA(I.J) =+.7(F10.8.2X))
  BBB FDRMAT(20x++R==+FB+2+2x++AAAA=++F1)+6+2x++bBBB=++F1(+6+2x++DBBC=++
     7F10.0)
  556 FDHMAT(20%+*AP=*+F10+6+2%+*8F=*+F10+6+2%+*C5=*+F10+6+2%+*Dc=*+F10+
     (5)
  557 FURMAT(20x,+xROUND=+,F10.6.2x,+A2AA=+,F10.6.2x,+B256=+,F10.6.2x,+B256=
     X200=++F10+6)
  795 FORMAT(SILL)
 AAAA+BBBB+CCCCARE CONSTANTS FOR 2-TERM JAMBER+ X AND SGRT(X)
   ------CALCULATED FROMANOTHER PROGRAM CALLED *CAMBER
  AB+58+C8 AND DE ARE COEFFICIENTS FOR POLYNOMIALS FOR X GREATER THAN .6.
  CLDO AND CLODK ARE NO. DUMMY.
C SF4 IS USED FOR DETERMINING WHETHER TO CALCULATE BETA.
 1321 FORMAT(5E14.7)
C IFLAG=1 NEEDS DATA CARDS FOR SXSI(I). I=1.5. IREAD MAY BE SET TO 5.
C IF IFLAG=0. DATA .ILL BE READ EITHER FROM
         DATA CARD. IF IREAD=5
TAPE1 • IF IREAD=1.
  551 FORMAT(1015)
  201 FORNAT(418)
```

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252 FORMAT(4E14.7)
C DE.OG. OF ARE THE INCREMENTS FOR DERIVATIVES IN CXFNEW.
C DG=1.E-3 & DF=1.E-5 ARE USED BEFORE.
  229 FORMAT(3E14.7)
 1229 FORMAT(5X++HLPM=+14+2X+4HLPK=+14+2X+6HSPETA=+E14+7+FX+6H1FEAC=+11+
     x2x++%CH6Y=++13)
 5651 FORMAT(20x+86TAB AND BETAC AS FIRST GUESS=*+F10+5+2x+F10+5)
1324 FORMAT(10x+3HDE=+614+7+2x+3HDS=+614+7+3HDF=+614+7+2x+4HSF4=+614+7)
 1521 FORMAT(10X+*SBETA2=*+E14-7)
      SSETA2=SBETA2+PAI/133.
      BETAB=BETAB*PAI/150.
      BETAC=BETAC + PAI/180.
  _P4M=LPH2=VS2
      LPMM=LPM2
      NS 2=L = M2
      [P44]=[P44+1
      #RITE(6.1489) LPM2.ISHARP
 1439 FORMATCIDX . * LPM2 = * . 13.2 X . * 154ARP = * . £14.7)
C ISHARPEC FOR SHARP L.E.
C 1 FOR ROUNDED L.E.
      SEETA=SBETA+PAI/186.
      DO 999 IUKL=1.NITER
O FFF4 IS PROVIDED FROM CXFVE #+ BUT IF THE LOOP DOES NOT GO THROUTH
      IT. FFF4 OF PRESET VALUE MUST BE USED.
      ALFAID=ALFAIS
      SAMMAD=GAMMAS
      SOLID=SOLIS
       IF(NHK.EG.1) GO TO 240
      IF(NHK.EG.2) GO TO 241
SDLID=SCLIS+G.1+FLCAT(IUKL-1)
      30 TC 243
  241 GAMMAD=GAMMAS+2++FLOAT(IJKL-1)
      GD TO 243
  240 ALFAID=ALFAIS-2.*FLOAT(IUKL-1)
  243 CONTINUE
      XXEXXX
      ALFA1=ALFA1D+PAI/180.
      3549=1./$3LID
      GAMMATSAMMAD+PAI/181.
      DELTA=ALFA1+GAMMA
      FLAPAN= 0.
      WRITE(6+655) ALFAID+3AMMAD+SOLIC
  666 FORMATCIX.16MINCIDENCE ANGLE=.E14.7.1X.6mGAMMA=.E14.7.1X.9mSCLIDIT
     XY=+E14+7)
      WRITE(5+653) FLAPAN
  663 FORMAT(5x+11HFLAP ANGLE=+E14+7)
      STOLL=2.E-4
      STCLS=5.E-4
      ERC=1.E-2
      CLE=1-E-4
       wRITE(6+511) CAVLEN
  511 FORMAT(10x++CAVITY LENGTH=++E14+7)
C SPECIFY HYDROFOILTS CHAFACTERISTICS AND SEP. POINTS.
      YC=: .
      x3=C.
      X 4 = 1 .
      XX00=1.03600
      YYDD=A5U+35U+C5U+D8J
```

```
WRITE(6.502) XA+X8+XC+YC+XXDD+YYDD
  502 FORMAT(10x+6HCHORD=+214-7-2x+17-HUPPER SEP. PCINT=+E14-7+2x+2CHCONN
     Y F10.6)
C START ITERATIVE PROCEDURE.

C ----BASIC FLOW IS THAT OF FLAT PLATE----.
C ----BASIC FLOW IS THAT OF FLAT FLATE--
C TITERAT IS INDEX FOR NUMBER OF ITERATIONS.
      ITERA=1
      IF (IFLAG.EG.0) ITERA=2
      BIGS=0.
      XHIGH=0.
      X_04=0.
      IS112=0
      XINCRT=XA/50.
      DO 248 IINC=1.50
      XLOW=XHIG+
      XHIGH=XLOW+XINCRT
      CALL ARCLEN(S.XLOW.XHIGH.IS112)
  248 51GS=81GS+S
  ----FIND BIGS2---
          FIRST CALL SHAPE TO FIND A CORRESPONDING TO CAVLEN.
      XCCC=CAVLEN
      XFREED=CAVLEN
      CALL SHAPE(CAVLEN-Y-BETA-3)
      #RITE(6+2000) Y
 2030 FORMAT(5X++Y=+E14+7)
      YFREEC = Y
      YCCC =Y
      CALL ARCS2(BIGS2.CAVLEN.Y)
      #RITE(6.504) BIGS.BIGS2
  534 FORMAT(10X.5HBIGS=.E14.7.5X.+313S2=+.E14.7)
C CALCULATION OF THE BLADE TRAILING EDGE THICKNESS.
      CALL SHAPE(1.0. UPEND. BETA. 3)
      CALL SHAPE(1.0.DNEND.BETA.0)
      THEL=UPEND-ONEND
      #RITE(6,2001) UPEND, DNEND, THBL
 2031 F3RMAT(10x+=UPEND AT x=1 ----++F6++3x++DNEND X X X=1 ----++
        F5.4.3X.*BLADE THICKNESS AT X=1 ----*.F6.4)
      STOL=1.E-5
      I PM=! PMS
      LPK=LPKS
      LPM1=LPM-1
      LPM3=LPM-3
C TOPT IS USED FOR CONTROLLING PROGRAM; O FOR ITER: 1 FOR THE REST: C FIND XSIB:XSIC:XSIF:A:ALFA2 BY USING NEWTON:S METHOD:
SXSI(1)=XSIE
 SXSI(2)=XSIC
C SXSI(3)=XSIF
 SXSI(4)=A WHICH IS THE COEFFT. OF MAPPING FCN.
 SKSI(5)=ALF2
 SXSI(6)=SIGMA
2 S(SI(7)=XSIG (LOWER FIRST WAKE CLOSUER POINT)
2 SXSI(8)=XSIH (UPPER FIRST WAKE CLOSUER POINT)
      IF (IJKL.GE.2) GC TO 530
      IF(IFLAG.EG.D) GO TO 779
C INATIAL GUESS FOR SXSI(I) IS -----
      READ(5+768) (SXSI(KX)+KX=1+8)
      GO TO 160
 779 READ(IREAD+620) (SXSI(KX)+KX=1+8)
 620 FORMAT(8F10.7)
```

```
629 DO 621 IC=1.LPM
  621 READ (IREAD. 622) SARC (IC) .BETAN (IC)
  522 FORMAT(2E14.7)
       00 1621 IC=1.LPMM1
 1621 READ(IREAD+622) SARC2(IC)+BETAN2(IC)
       IF (IFLAG .E2.0) SO TO 480
       GO TG 481
  430 00 482 IST=1.LPM1
432 BETAM(IBT)=.5+(BETAN(IBT)+BETAN(IBT+1))
  431 CONTINUE
  150 ICPI=0
       #RITE(6+102) ITERA
  132 FORMAT(10x+14HITERATION NO.=+12)
       00 850 IRP=1.8
  850 SXSIO(IRP)=SXSI(IRP)
       IF (ITERA .GE . 2) STOL=STOLS
       IF (ITERA-EG-MSTOP) STOL=STOLL
C
       CALL DXFNEH(SXSI,STDL,MAXIT,ITN,DG,DF,FFF4)
  530 CONTINUE
       00 537 101=1.8
       XSN(ID1)=SXSI(IC1)
  537 WRITE(6.53a) IC1.SXSI(IC1)
  536 FORMAT(1CX+5HSXSI(+I1+2H)=+E14+7)
CSPACE=(1++SXSI(1))/FLOAT(LPK)
       HCSPAC=0.5 + CSPACE
       FSPACE=CSPACE/FLOAT(_PM-LPK)
       HFSPAC=5.5+FSPACE
       ABET=-1.+CSPACE+FLCAT(LPK-1)
       ICPI=1
C ISPI=0 FOR FINGING SXSI(I), I.E., SXSI(I)=YX3(I)\geq ISPI=1 FOR THE REST. CALCULATION OF PRESSURE DISTRIBUTION 10°1.
       IF (ITERA-EG-1) 30 TO 36
       D0 35 IB=1+LP4
   35 BETANO(IB)=BETAN(IB)
       LJ 37 IS=1.LPM1
   37 BETAMO(IB)=BETAM(IB)
  DC 355 IB=1+LPMM1
355 BETAG2(IB) = BETAN2(IB)
   36 CONTINUE
       UU2=COS (ALFA1+GAMMA)/COS (SXSI(5)+GAMMA)/ESPACE
                               )7(ISXS/)AMMAG+)E(ISXS(SCC/)AMMAG+1AFLA(SC=2UU
C
       UU22=UU2 **2
       UCU1=SQRT(1.+SXSI(6))
       GHU1=UCU1+CAVLEN+UU2+(1.-CAVLEN)
       9-U12=9-U1++2
       CPW=1.-QWU12
       IF (JTAU-EQ-1) CPH=-SXSI(E)+CAVLEN+(1--UU22)+(1--CAVLEN)
       00 25 LG=1.LPM
C FIND CP(ASIP) VEXT.
C---- FOR THE FIRST WETTED ARC PORTION S1----
      CP IS BASED ON U1 AND P1.
```

```
LP=1 IS NEAR THE T.E.
     LPELPH IS NEAR THE L.E.
     IF(LF.EQ.1) GO TO 521
     IF(LP-EG-LPM) GO TO 52
     22=EXP(XITN(LP))
C XITN(I) IS CALCULATED IN OFSIM2 OF OXFNEW FOR F(4).
     Q2=Q2**2
     CP(LP)=1.-UU22+Q2
     GO TO 522
  52 CP(LP) =- SXSI(6)
     SO TO 522
  521 C3 (LP)=CP4
  522 CONTINUE
  25 CONTINUE
                                                                EUNITHCC 431
00000
                                                              .C=) MP_(PC
                                        13+G21X+PCY+PCX(NEKTIA=)1-MPL(PC
                                        )3+911X+FCY+PCX(NEKTIA=)2-MPL(PC
                                                     ECAPSF-)1(ISXS=021X
                                                  ECAPSF + . 2- ) 1 ( ISX S= 911X
                                                              . C= )4(PCY
                                                        )3-4PL (PC= )3(PCY
                                                        ) 5-MPL (PC=)2(PCY
                                                        )7-4FL(PC=)1(PCY
                                                         )1(ISXS=)4(PCX
                                                 ECAPSF+ +2+) 2 (FCY= ) 3 (PCX
                                                 ECAPSF* - 2+) 1 (PC x= )2 (PCX
                                                ECAPSF +.7-)1(ISXS=)1(PCX
                                                431 OT OG )1.GE.ARETI(FI
C-----CP FOR THE SECOND ARC S2-----
        NUMBER OF CONTROL POINTS ON S2 IS FIXED
        IN SUBJUSTICE OFFICES IN SUBJECT OF THE POINT USED FOR BETA
     ANSGES IN COMMON = G2.
     IF(NCP.EG.1) GO TO 681
     IF (NCP+EG+LPMM1) GO TO 682
     Q2 = EXP(ANSG2S(NCP))
     22 = 22 **2
     C22(NC2) = 1.-02*UU22
     GO TO 660
  631 CF2(NCP)=-SXSI(6)
     50 TG 686
 632 CP2(NCP)=CP#
  630 CONTINUE
AF4=ABS(FFF4)
     IF (AF4.GE.SF4) GO TO 1135
     30 TO 1134
1135 #RITE(5+1136)
 1136 FORMAT(5x++F(4) IS TOO LARGE TO CALCULATE BETA+)
```

```
STOP
C FIND XXX(XSIP) FIRST.
1134 CONTINUE
     IS1S2=0
C----FIRST BETA FOR ARC 1-----
     00 100 LL=1.LPM
LP=LPM-LLP+1
     CALL SBBETA(XYX.BETA.IS1S2)
     XXX(LP)=XYX
     BETAN(LP)=BETA
     IF (LP.EQ.LPM) BETAB=BETA
     IF (ITERA . LE . MSTOP1) 30 TO 100
     #RITE(6,101) LP+SARC(LF)+XXX(LP)+CP(LP)+BETAN(LP)
 106 CONTINUE
 101 FORMAT(1x+2HI=+13+1X+5HSARC=+E14+7+1X+4HXXX=+E14+7+1X+3HCP=+E14+7+
    X1X+6H8ETAN=+E14+7)
C-----BETA FOR ARC S2------
           SARCZ HAS BEEV CALCULATED
OVA SMICZO ENITUDIOS
           STORED IN COMMON AREA.
     IS1S2 = 1
     D3 429 LLP=1+LPMM1
     LP=LLP
     CALL BBBETA(XYX.BETA.IS1S2)
IF(LP.EG.1) BETAC=BETA
     xxx2(LP) = xyx
     BETANZ(LP) = BETA
     IF (ITERA-LE-MSTOP1) GO TO 329
     #RITE(6,239) LP,SARC2(LP),XXX2(LP),CP2(LP),BETAN2(LP)
 239 FORMAT(9x++1=++13+1x++SARC2=++E14+7+1x++XXX2=++
    *E14.7.1x.*CP2=*.E14.7.1x.*BETAN2=*.E14.7)
 329 CONTINUE
 429 CONTINUE
Consensation AIN INSERT 2 ********************************
C FIND LIFT AND DRAG.
   -----FIRST CL AND CD FOR SI PART.
     USID = SIN(DELTA)
     CATIBOD = COSCDELTA)
     UX8 = SXSI(4)+UCOD
     UX82 = UX8++2
     30 105 ITK = 1.LPM
     IF(ITK.GT.LPK) GO TO 106
     x=S = -1.+CSPACE+FLJAT(ITK+1)
     GC TO 198
 106 XPS = XBET+FSPACE+FLDAT(ITK-LPK)
 138 CONTINUE
     UXA = XPS-SXSI(4)+USID
     JXA2 = UX4++2
```

```
PXXP = UCOD/(UXA2+UXB2)
      Dabx = DGAP+PXXP+XPS/PAI
               = COS(BETAN(IT())
      CDBET1
      SIBETI
                 = SIN(BETANCITK))
      DSIDX = -EXP(-XITY(IT())+0W0X/UJ22
      G1 IS CALCULATED AT JFSIM2 AS XITN(I).
      . NOPMCD IN COMMON.
      IF(XPS.LT.O.) DSIDX = -DSIDX
      XLP1 = GS1DX *CP(ITK)
      FL(ITK) = -XLP1+COBET1
FD(ITK) = XLP1+SIBET1
  135 CONTINUE
C----CL AND CD FOR S2 PART.
      NS21=NS2+1
      NS24=NS2-1
      SAP2 = (SXSI(3)-SXSI(2))/NS2
      DJ 333 ITK = 1 • NS21

XRS2 = SXSI(2)+GAP2*(ITK-1)
      UXA = XRS2-SXSI(4)+JSID
      UXA2 = UXA++2
      PXXP = UCOD/(UXA2+UXB2)
      DWDX = DGAP+PXXP*XRS2/PAI
      COBET2 =-COS(BETAN2(ITK))
      SIBET2 =-SIN(BETAN2(ITK))
      DS2DX = EXP(-ANSG2S(ITK)) +D#DX/JU22
      32 IS ALREADY CALCULATED AT OFSIM5 AS
      ANSGES(I) - STORED IN COMMON AREA.
      xLP2 = DS2DX+CP2(ITK)
FL2(ITK) =-XLP2+C08ET2
      FD2(ITK) = XLP2+SIBET2
  338 CONTINUE
      SPACE = CSPACE
      CLIFT = 0.5+CSPACE+FL(2)+0.5+FSPACE+FL(LPM1)
      CDRAG = 0.5 + CSPACE +FD(2) +0.5 +FSPACE +FD(LPM1)
      DC 111 IUA = 2.LPM3.2
      IF (IUA . GE.LPK) SPACE = FSPACE
      CLIFT = CLIFT+SPACE+(FL(IUA)+4.+FL(IUA+1)+FL(IUA+2))/3.
  111 CDRAG = CDRAG+SPACE+(FD(IUA)+4.+F)(IJA+1)+F)(IUA+2))/3.
      00 321 IUA = 1.NS2A.2
      CLIFT = CLIFT+GAP2+(FL2(IUA)+4++FL2(IUA+1)+FL2(IUA+2))/3+
  321 CDRAG = CDRAG+GAP2+(FD2(IUA)+4.*FD2(IUA+1)+FD2(IUA+2))/3.
     -ADD THE FORCES ON CAVITY PORTIONS.
      SUPROUTINE XCYC CALCULATES
    THE POINT ON THE UPPER BLADE PORTION CORRESP. TO THE CAVITY END POINT.
      CXA=XCCC
      CYA=YCCC
      CALL XCYC(XCCCB, YCCCB, CXA, CYA)
      CLIFT = CLIFT+SXSI(6) *XCCCB
      CDRAG = CDRAG-SXSI(6)+YCCCB
C---- BASE PRESSURE PW.
     CORAG=CDRAG-CPW+THBL
    -- XCCC AND YCCC ARE THE END POINTS OF CAVITY, CALCULATED IN
      SUBROUTINE CAVITY
      STORED IN COMMON.
C FIND BINF IN 2-1.
```

```
U2U1=COS(ALFA1+GAMMA)/COS(SXSI(5)+GAMMA)/ESPACE
      DCWN=CCS(ALFA1+GAMMA)+COS(SXSI(5)+GAMMA)
      BINF=0.5+SIN(ALFA1+SxSI(5)+2.+GAMMA)/DOWN
      BINF=ATAN(1./BINF)
      AINF=G.5+PAI-BINF-GAMMA
C COSTAR AND ALSTAR ARE BASED ON VELOCITY AT UPSTREAM INFINITY IN (X.Y).
      CDSTAR=CDRAG
      CLSTAR=CLIFT
      UINF=0.5+SQRT(1.+U2U1++2+2.+U2U1+COS(ALFA1-SXSI(5)))
      FINF=2. +DGAP+SIN(ALFA1-SXSI(5))/(UIVF+COS(SXSI(5)+GAMMA))
      CLINF=CLSTAR + CCS(AINF) - CDSTAR + SIN(AINF)
      CDINF=CLSTAR+SIN(AINF)+CDSTAR+COS(AINF)
      CLINF=CLINF/UINF++2
      CDINF=CDINF/UINF++2
      WRITE(5+117) CLINF+CDINF
  117 FORMAT(1X+34HCLINF OR CDINF=FORCE/1/2RO-UINF++2+5x+6HCLINF=+E14+7+
     X1X+5HCDINF=+E14+7)
      #RITE(6.118) FINF
  118 FORMAT(1x+34HFINF IS OBTAINED FROM MOMENTUM EGN+6HFINF=+614.7)
      #RITE(6,221)
  221 FORMAT(1x+46H---CCLL & CCDD ARE BASED ON U1 IN ALFA1 DIRE----)
     CCLL=CLSTAR + COS(ALFA1) - CDSTAR + SIN(ALFA1)
      CCDD=CLSTAR+SIN(ALFA1)+CDSTAR+COS(ALFA1)
      ALGD=CCLL/CCDD
     -RITE(6+131) CCDD+CC_L+ALOD+U2U1
  181 FORMATC1X+5HCCDD=+E14+7+1X+5HCCLL=+E14+7+1X+4HL/D=+E14+7+1X+
             5dU2U1=+E14+7)
     MSTOP1=MSTOP=1
     IF (ITERA-LE-MSTOP1) 30 TO 148
С
C***********AIN INSERT 4 **********************
     CAVITY SHAPE.
        ALREADY CALCULATED IN
        SUBROUTINE CAVITY.
     WRITE(6+287)
  237 FORMAT(2X++---CAVITY SHAPE-----)
     NCAV1=NCAV+1
     33 285 KCAV=1.NCAV1.2
  285 WRITE(6+286) CAVX(KCAV )+CAVY(KCAV )
  286 FORMAT(13x+*x=*+E14+7+10x+*Y=*+E14+7)
140 CONTINUE
     xccc=0.
     YCCC=3.
     #RITE(6+823)
  B23 FORMAT(//++------)
     00 821 ISHP=1.51
     X = .02 + (IS4P-1)
     CALL SHAPE (X+Y+BETA+3)
  921 #RITE(6,822) X+Y
  522 FORMAT(5x+*X=*+F10+5+2X+*Y=*+F10+5)
     REMIND 7
     #RITE(7.763) (SXSI(<x).KX=1.8)
```

```
756 FORMAT(8F10.7)
DO 766 IC=1.LPM
756 WRITE(7.767) SARC(IC).BETAN(IC)
757 FORMAT(2E14.7)
     00 1766 IC=1.LPMM1
1756 ARITE(7.767) SARC2(IC).BETAN2(IC)
     IF(ITERA-GE-MSTOP) 30 TO 999
     LPK1=LPK-1
     SPACE=CSPACE
     HSPACE=HCSPAC
     30 50 IM=1.LPM1
     IF(IM.E2.1) 50 TO 51
     IF(IM-EG-LPM1) GO TO 55
     IF (IM-EG-LPK1) GO TO 97
     IF (IM-EG-LPK) GO TO 98
     IF (IM.GT.LPK) GD TO 93
     XY=-1.+SPACE+FLCAT(IM-1)+HSPACE
     XZ(1)=-1.+SPACE+FLOAT(IM-2)
     XZ(2)=XZ(1)+SPACE
     XZ(3)=XZ(2)+SPACE
     XZ(4)=XZ(3)+SPACE
     GO TO 99
  93 SPACE=FSPACE
     HSPACE=HFSPAC
     XY=XBET+HSPACE+ SPACE+FLOAT(IM-LPK)
     XZ(1)=X5ET+SPACE+FLDAT(IM-LPK-1)
     XZ(2)=XZ(1)+SPACE
     XZ(3)=XZ(2)+SPACE
     XZ(4)=XZ(3)+SPACE
  99 DO 56 IK=1.4
  56 YBE(IK)=BETAN(IM+IK-2)
     BETAMCIM) = AITKEN(XZ+Y8E+XY+3)
     30 TO 151
  97 BETAM(LPK1)=0.5+(BETAN(LPK1)+BETAN(LPK))
     GO TO 151
  98 BETAM(LPK)=0.5+(BETAV(LPK)+BETAN(LPK+1))
     33 TO 151
  51 BETAM(1)=0+5+(BETAN(1)+BETAN(2))
     GC TO 151
 55 BETAM(LPM1)=0.5+(BETAN(LPM1)+BETAN(_PM))
151 CONTINUE
  50 CONTINUE
     IF (ITERA+EG+1) GC TO 6
     D0 41 IE=1.PM
  41 BETANCIE)=BETANCIE)+(1.-xxM)+BETAVOCIE)+XXM
     DO 42 IFG=1.LPM1
  42 BETAM(IFG)=BETAM(IFG) + (1.-XXM) +BETAMO(IFG) +XXM
     00 425 IFG=1.LPMM1
 425 BETAN2(IFG) = BETAN2(IFG)*(1.-XXM)+BETAG2(IFG)*XXM
D3 852 IRP=1+8
352 SXSI(IRP)=SXSI(IRP)+(1.-XXM)+SXSI3(IRP)+XXM
   6 ITERA=ITERA+1
     IF(ITERA.GT.MSTOP) GO TO 28
     30 TO 160
  28 #RITE(6,29)
  29 FORMAT(5x+26HITERATION WAS TERMAINATED+)
 339 CONTINUE
     STOP
     END
```

```
SUBROUTINE DXFNEW(X+STOL+M+I+DG+DF+FFF4)
              DIMENSION F(8) + P(50+3) + X(8) + Q(6+8) + X RRI(6) + X MMI(8)
              COMMON/DELTAG/DELT(3+3)
              SOMMON /CVTYL/CAV_EN.BIGS2
              COMMON/FREECAV/XFREEC+YFREEC
              SATEER+SESY NOPPCE
              COMMON XITM(200) +XITN(200) +ANSG2S(200) +SARC2(200)
              COMMON CAVX(100) . CAVY(100) . BETAB . BETAC . XCCC . NOAV . _ PMM . NS2
             CODI) SHATE, (COL) SHATE, (COL) MATERIAL (COL) COPEC COLOR (COL) COPEC COPEC COLOR (COL) (COL) (COLOR (COL) COLOR (COL) (COL) (COL) (COLOR (COL) COLOR (COL) (COL) (COLOR (COL) (COL
                                             SBETA . K(4. ICPI, SARCO3(513)
              PCPPED
              COMMON IDULAXAXXAXXCATANGAEPAYCAYRAJBIGSAXLBIGSABIGSASMALSADSS
                                                           CLE+ERC, YYY, XM, ITERA, SXSID(8), SXSIDD(8), YXS(8)
              . (E) VZX VOPPCD
              COMMON PSIZ-LP-SARC(513)+SARCO(513)+LPM-DE
              COMMON BETAN(513) . BETAN(513) . I J. L. PK. XII (200) . X JJ (200) . X JX
              COSO-BESE, AASA, GRUCRK ROPMCC
              SUADN (COCI) SUADN (COCI) SUACT , CC. ED , EB , CC. CC. CC. AGAAA NOPPCC
              SCA SZINOSZIVCHECO
              COMMON/TAU1/JTAU
             P4I=3-141592653
              I = 0
              IF(ITERA - E - 3) GO TO 272
             33 57 IIJ=1+8
      57 WRITE(6.65) IIJ.X(IIJ)
      56 FORMARCIX+24X(+I1+24)=+E14+7)
    272 CONTINUE
              SI7=-1.-2.*JE_T(7:1)
       55 SI1=2.*DE
              316=2. + DG
              I = (x(7).31.$I7) x(7)=$I7
              I=(x(1).LT.SI1) x(1)=SI1
              $110=x(1)+2.+3G
              I=(x(2).LT.SI10) x(2)=SI10
              SI11=x(2)+2.*D6
              IF (x(3) \cdot LT \cdot SI11) \times (3) = SI11
              SI8=x(3)+2.*DELT(8.1)
              I = (x(3) \cdot T \cdot SI3) \times (3) = SI3
              I=(x(4).LT.SI5) x(4)=SI6
              SI5=(0.5=241-GA44A)+(1.-0.02)
              IF (X(5) .LT.0.) GO TO 78
              I=(x(5)*GT*SI5) x(5)=SI5
              GO TO 79
       78 I=(ABS(X(5)).GT.SI5) X(5)=-SI5
       19 CONTINUE
              I=(x(5).LE..001) X(5)=.001
              33 58 IIJ=1+8
       16 WRITE(6+66) IIJ+X(IIJ)
             IJ=1
33 28 IK=1+8
20 YXS(IK)=X(IK)
         5 CONTINUE
              KOTRL = 1
              CALL FIINTL(YINT1+KCTRL)
              SUBROUTINE FIINTL CALCULATES THE INTEGRALS IN F(1).
              COTRL = 2
CAL_ FIINT_ (YINT2, COTRL)
              KOTRL = 3
              DALL FIENTL CYINTS+KOTRL)
              KETRL = 4
```

```
CALL FIINTL (YINT4, KCTRL)
    KOTRL=5
    CALL FIINTL(YINT5+KOTRL)
    KCTRL=5
    CALL FIINTL(YINT6+KOTRL)
    CCC1=ALOG(1.+YXS(6))/(2.+PAI)
    CS1=ALDG (CDS (YXS (5)+34MMA)/CDS (ALFA1+GAMMA) *ESPACE)
    SSG=SGRT(1.+YXS(6))
    12=CDS(ALFA1+GAMMA)/CDS(YXS(5)+GAMMA)/ESPACE
    U22=U2**2
    U22I=1./U22
    T#0=SSG+CAVLEN/U2+(1.-CAVLEN)
    TAUM GEAL OG (THO)
    T=1=S3RT(1--(1--YXS(5)-U22I) *CAVLEN)
    TAUW1=ALOGETW1)
    DEUATERUAT (DECEMBATE) FI
    IF (UTAU.EG.1) TAUW=TAUW1
    FA = -(YINT1/PAI+YINT2-(CCC1+CS1/PAI)+YINT3
   1+YINT4/PAI-YXS(5)+TAJ++(YINT5-YINT6)/PAI)
    IF (IJ.EQ.1) WRITE (5.70) YINT1.YINT2.YINT3.YINT4
 70 FORMAT (10x++--- 11+12+13+14 OF F(1) ARE---++4(E14+7+2X))
    IF (IJ.EQ.1) F(1) = FA
    IF (IJ.EG.2) GO TO 3
    IF (IJ.EQ.3) SO TO 4
    I= (IJ.EG.4) GO TO 320
    IF (IJ-EQ-5) GO TO 321
IF (IJ-EQ-6) GO TO 322
    I=(IJ.E2.66) 60 TO 3222
    IF (IJ.EQ.480) GO TO 400
    I= (IJ.EG.401) GO TO 401
    I= (IJ.E3.402) G3 T3 402
    IF (IJ.E4.443) 30 TO 443
    TYS=TAV(YXS(S)+GAMMA)
    SUVORT-EACHTEN+SSG/TWO/U2
    IF (UTAU-E3-1) DTHD4=-CAVLEN+TY5/J22/(TH1++2)
    DTWDS=.5/J2+CAVLEN/SSG/TWO
    I= (JTAU.EG.1) OTHDS=3.5+CAVLEY/(TH1++2)
    P(1.5) = TAN(YXS(5)+SAMMA)*YINT3/PAI-1.+(YINT5-YINT5)/PAI+CTWDA
    P(1.6) =-YINT3/(2.+PAI+(1.+YXS(6)))+(YINT5-YINT6)/PAI+DTHDS
    IJ = 2
    YXS(1) = X(1) + DELT(1+1)
  30 TO 5
3 F1P = -FA
    IJ = 3
    YXS(1) = X(1) - 0 = LT(1+1)
    GO TO 5
  4 F1Q = -FA
    P(1+1) = (F1P-F1G)/(2++DELT(1+1))
    IJ = 4
    YXS(1) = X(1)
    YXS(2) = X(2) + DELT(1+2)
    33 TO 5
320 F1P = -FA
    YXS(2) = X(2) - DELT(1+2)
    LJ = 5
33 TO 5
321 F1Q = -FA
    P(1,2) = (F1P+F1Q)/(2.+DELT(1,2))
YXS(2) = X(2)
    YXS(3) = X(3) + DELT(1+3)
```

```
IJ = 5
      GO TO 5
  322 -10 = -FA
      IJ=56
      YXS(3) = X(3) - DELT(1,3)
      30 10 5
 3222 F1Q=-FA
      YXS(3)=X(3)
      P(1+3) = (F1P-F1Q)/(2*+DELT(1+3))
      P(1.4) = 0.
      13=463
      ABSX7=ABS(X(7))
      YKS(7)=X(7)+DELT(1+7)+ABSX7
      GO TO 5
  430 F1P=-FA
      IJ=401
      YXS(7)=X(7)-DELT(1.7) *A3SX7
      33 13 5
  431 F1G===A
      P(1+7)=(F1P-F1Q)/(2++)ELT(1+7)+ABSX7)
      YXS(7)=X(7)
      IJ=402
      YXS(8)=X(3)+DELT(1+3)
      30 TO 5
  412 =13==FA
      IJ=443
      YXS(8)=X(8)-DELT(1,8)
      60 TO 5
  4+3 F1 Q===A
      P(1,3)=(F12-F1Q)/(2.*DELT(1,8))
      YXS(8)=X(9)
IJ = 7
  350 CONTINUE
      XKKX=ALOG(COS(ALFA1+GAMMA)/JOS(YXS(5)+GAMMA)/ESPACE)
                     )) 7(Sky/) AMMA3+) 5(Sky(SDC/) AMMA3+1 AFLA (SDC (GCLA = x<KX
      XX1 = YXS(4) + SIN(DE_TA)
      YY1 = YXS(4) + COS(DELTA)
      YY12=YY1**2
      CCC1=ALOG(1.+YXS(6))/(2.+PAI)
      CON1 = CCC1-XKKX/PAI
      x 2 R = 0.
      X44 = 0.
      DD 331 MIQ = 1+6
      CALL RMINT(SOLNR+SOLV4+MIG)
      RELEGIOUS SOLVE
      MMMI (MIQ) = SOLNM
      xRRR = -xRRI(412)/P41
      IAS/(GIP)IPPX- = PMPX
      L= (MIQ.EQ.1) XRRR = CON1+XRRI(MIQ)
      I= (MIQ.EQ.1) XMMM = CON1+K441(412)
      IF (MIG-E2-4) XRRR = -XRRI(MIQ)
      I = (MI3 + E3 + 4) \times MM4 = - \times MM1 (MI3)
      IF (MIQ.EQ.5) XRRI(MIQ)=-XRRI(MIQ)/>AI
IF (MIQ.EQ.5) XMMI(MIQ)=-XMMI(MIQ)/>AI
      IF (MIG.E3.6) XRRI(413)=XRRI(413)/941
I= (MIG.E3.6) XMMI(413)=XM4I(413)/941
      IF ((JTAU-E3-D)-AND-(413-82-5))
IF ((JTAU-E9-D)-AND-(419-82-5))
                                              OLLAT - (CIP) ISSX=SSSX
                                              OWUAT+(GIF) IMMX=MMMX
      IF ((JTAULED-1)-AND-(410-35-5))
                                              INUAT - (CIP) IFFX=RFRX
```

```
IF ((JTAU-EQ-1)-AND-(MIG-GE-5))
                                             XMMM=XMMI(MIQ)+TAU#1
    IF (IJ.EQ.7) JRITE (5.71) (KRRICI). [=1.4)
IF (IJ.EQ.7) WRITE (5.72) (XMMICI). I=1.4)
 71 FORMAT(10x,----xRRI(1), I=1,4 OF F(2) AND F(3) ARE----,4(E14.7,2X))
72 FORMAT(10x,----xMI(1), I=1,4 OF F(2) AND F(3) ARE----,4(E14.7,2X))
    XRR = XRR+XRRR
    X44 = X44+X444
331 CONTINUE
  -- CALCULATION OF H1(ZETA1)-----
    XSIP1 = XX1+1.
    XSI4B = XX1-YXS(1)
    XSIMF = XX1-YXS(3)
    XSIMC = XX1-YXS(2)
    xSIP12 = xSIP1 ** 2
    xSIMB2 = XSIMB**2
    xSI4F2 = xSIMF**2
    XSIMC2 = XSIMC**2
    RRA = SGRT(XSIP12+YY12)
    RRC = SQRT(XSIMB2+YY12)
RRC = SQRT(XSIMF2+YY12)
    RRD = SQRT(XSIMC2+YY12)
    THIA = ATAN(YY.1/XSIP1)
    AIFT+IAG = AIHT (.C.3...1912x) 11
    (EPIZX/LYY) VATA = EIHT
    IF (XSIMB-LE-0-) THIS = PAI+THIS
    THIC = ATAN(YY1/XSI4F)
    IF (XSIMF-LE-0-) THIC = PAI+THIC
    THID = ATAN(YY1/XSI4C)
    IF (XSIMC-LE-0-) THID = PAI+THID
    RR1 = SGRT(RRA+RRB+RRC/RRD)
    (CINT-SINT+EINT+AINT)+c. = ITIFT
    COTH1 = COS(THIT1)
    SITH1 = SINCTHIT1)
    F2CO = RR1+(XRR+COTH1-XMM+SITH1)+ALFA1
    F3CD = RR1+(XRR+6IT+1+XMM+CDT+1)+XKKX
    1= (IJ.EG.7) F(2) = -F2C0
    LF (IJ.EQ.7) F(3) = +F3C0
    I= (IJ.EQ.3) GC TO 340
    IF (IJ.EG.9) 80 TO 341
    IF (IJ.EQ.10) GD TO 342
    I= (IJ.EQ.11) GO TO 343
    I= (IJ.EQ.12) GD TD 344
    IF (IJ.EQ.13) GO TO 345
    I= (IJ.EQ.14) GO TO 345
    IF (IJ.E2.15) 60 TO 347
    IF (IJ.EQ.4G3) GO TO 403
    I= (IJ.EQ.484) GO TJ 484
    IF (IJ.EQ.405) 60 TO 405
    I= (IJ.EQ.406) 30 T3 406
            TAV(YXS(5)+GA44A)
    TA2G =
    XCXS= XRRI(1)+COTH1 - XHMI(1)+SITH1
    XSXC= xRRI(1)+SITH1 + XMMI(1)+COTH1
    RC1=RR1+CJTH1
    RS1=RR1+SITH1
    xR56=xRRI(5)+xRRI(6)
    x456=x441(5)+x441(6)
    RR55=RC1+XR56-RS1+X455
    R455=RC1+X456+RS1+XR55
    P(2+5) = -RR1+TA23+KCKS
    P(2,5) = P(2,5)/PAI+RR56+0THDA
```

1

```
P(3+5) = -RR1+TA2G+X5XC
    P(3.5) = P(3.5)/PAI+TA2G+RM55+DTWDA
    BPY=2.*PAI*(1.+YXS(5))
    P(2.6) = RR1 + (XRRI(1) + COTH1 - X 44I(1) + SITH1) /8 - Y + R - C + DT # DS
    P(3,6)=RR1+(XRRI(1)+SITH1+XMMI(1)+COTH1)/BPY+RM56+DT#DS
    LJ = 3
    YXS(1) = X(1)+DELT(1+2)
    30 TO 330
340 FP2 = F2C0
    ==3 = =303
    IJ = 3
    YXS(1) = X(1) - DELT(2,1)
    30 10 330
341 P(2.1) = (FP2-F2C3)/(2.+DELT(2.1))
    P(3+1) = (FP3-F3CO)/(2+DELT(2+1))
    YXS(1) = X(1)
    YXS(2) = X(2)+3ELT(2+2)
    IJ = 10
    30 TO 336
342 FP2 = F203
    FP3 = F300
    YXS(2) = X(2)-DELT(2+2)
    IJ=11
    30 TO 330
343 P(242) = (FP2-F2C3)/(24+3ELT(242))
    P(3,2) = (FP3-F3C0)/(2.*DELT(2.2))
    YXS(2) = X(2)
               x(3)+DELT(2+3)
    YXS(3) =
    IJ = 12
30 TO 330
344 FP2 = F2C0
    F>3 = F3C3
    YXS(3) = X(3) - DELT(2+3)
    IJ = 13
    GO TO 330
3+5 P(2+3) = (=P2-F2C))/(2++0E_1(2+3))
    P(3,3) = (FP3-F3CO)/(2.+OELT(2,3))
YXS(4) = X(4)+DELT(2,4)
    YXS(3)=X(3)
    IJ=14
    33 TO 330
346 FP2=F2C0
    FP3=F3C0
    YXS(4) = X(4)-DELT(2+4)
    IJ = 15
    30 TO 330
347 P(2+4) = (FP2-F2C0)/(2.+DELT(2+4))
    P(3+4) = (FP3-F3CD)/(2++DELT(2+4))
    YXS(4)=X(4)
    IJ=403
    YXS(7) = X(7) + DELT(2+7) + ABSX7
    30 10 330
433 FP2=F2C3
    FP3=F3C0
    YXS(7)=X(7)-DELT(2.7)+ABSX7
    IJ=404
    30 TO 330
434 P(2,7)=(FP2-F2C3)/(2.+DELT(2,7)+A3S(7)
    P(3,7)=(F23-F3C0)/(2.*DELT(3,7)*ABSX7)
    145(7)=X(7)
```

```
IJ=405
      YXS(8)=X(8)+DELT(2+8)
      SO TO 330
  435 FP2=F2CD
      F>3=F3C0
      IJ=405
      YXS(8)=X(3)-DELT(2+3)
      GO TO 330
  406 P(2+8)=(FP2-F2C0)/(2++0ELT(2+8))
      ?(3,8)=(F?3-F3C))/(2.*DELT(3,3))
      YXS(8)=X(3)
LJ=16
      YXS(1) = X(1) + DELT(4+1)
  199 CALL OFSIM2(ANS2)
IF(IJ-EG-15) GD TD 513
      I=(IJ-EQ-17) GC TO 514
      If(IJ.EG.19) GO TO 575
      LF(IU.EG.19) 30 TO 515
      IF (IJ.EG.20) GO TO 515
      IF(IJ.E2.21) 30 TO 517
      IF(IJ.EQ.22) SO TO 518
IF(IJ.EG.23) GO TO 521
      I=(IJ-EQ-24) GO TO 522
      IF(IJ-EG-25) 60 TO 523
      IF(IU.E3.25) GO TO 524
      I=(IJ.EG.261) GO TO 5241
      I=(IJ+E2+252) GD TD 5242
      IF (IJ.EG.407) GO TJ 407
IF (IJ.EG.408) GO TJ 408
      IF (IJ.EQ.409) 50 TO 409
IF (IJ.EQ.410) 50 TO 410
  SI3 ANSPEANSE
      IJ=17
      Y4S(1) = X(1) - DELT(4+1)
      GO TO 199
  514 4VS3=4VS2
      IJ=18
      P(4+1) =- (ANSP-ANSQ) / (2 -+ DELT(4+1))
      YXS(1)=X(1)
      30 TO 199
  575 ANSF=ANS2
      F(4) =- (BIGS-ANSF)
      IJ=19
      YKS(2)=X(2)+DE_T(4+2)+A3S(X(2))
      30 TG 199
  SIE ANSPREANSE
      IJ=20
      YXS(2)=X(2)-OELT(4,2)+ABS(X(2))
      30 TO 199
  SIS ANSTREAMS2
      ?(4,2)=-(AVSP?-AVS33)/(2.+)ELT(4,2)+ABS(X(2)))
      YXS(2)=X(2)
      LJ=21
      YXS(3)=X(3)+DELT(4+3)+X(3)
      33 [3 199
  517 AVSIPRANSE
      IJ=22
      YXS(3)=X(3)-DELT(4+3)+X(3)
      GO TO 199
```

```
513 AV$12=AN$2
     P(4+3) =- (ANS1P-ANS1Q)/(2+0ELT(4+3)+X(3))
     YXS(3)=X(3)
     IJ=52
     YXS(4)=X(4)+DELT(4+4)+ABS(X(4))
     30 TO 199
 521 ANA=ANS2
     13=24
     YXS(4)=X(4)-DELT(4,4)+ABS(X(4))
     33 10 199
 SEE AVE=AVSE
     P(4,4) = - (ANA-ANB)/(2. + DELT(4,4) + ABS(X(4)))
     YXS(4)=X(4)
     IJ=25
     YXS(5)=X(5)+DELT(4+5)
     50 TO 199
 523 BVA=AVS2
     1J=26
     YXS(5) = X(5) - DELT(4,5)
     33 TO 199
 524 BYB=ANS2
     ?(4.5)=-(3NA-BNB)/(2.*DELT(4.5))
     YXS(5)=X(5)
     F=F4=F(4)
     148(5) = ((5)
     YXS(6)=X(6)+DELT(4,6)
     IJ=261
     30 TO 199
5241 BYA=ANS2
     IJ=262
     YXS(6)=X(5)-DELT(4+5)
     33 13 199
5242 3N8=ANS2
     P(4+6)=-(3NA-3N3)/(2.+DELT(4,5))
     YXS(6)=X(6)
     IJ=407
     YXS(7)=X(7)+DELT(4,7)+ABSX7
     33 FO 199
 437 AVA=AVS2
     YXS(7)=X(7)-DELT(4.7) + ABSX7
     IJ=403
     SO TO 199
 ADE AVBEANS2
     P(4.7) = - (ANA-ANB)/(2.*DELT(4.7) * ABSX7)
     YXS(7)=x(7)
     YXS(5)=X(3)+DE_T(4+3)
     IJ=409
     30 TO 199
 409 ANA=ANS2
     IJ=410
     YXS(8) = X(3) -DELT(4+3)
     30 TO 199
 ALO ANBEANS2
     P(4+8) =- (ANA-ANB)/(2++DELT(4+8))
     YXS(8)=X(9)
  ---F(5) AND F(7)-----
 *YTIVAS TO TVICE CV3 3HT SCHIR BYITUGREUS SIFT
     IJ = 27
 BIS CALL CAVITY (XCEND+YCEND)
     IS1I2=3
```

```
CALL SHAPE(XCEND+YUPPER+BETA+IS112)
    I=(IJ-EQ-27) 30 TO 320
LF(IJ-EQ-28) 30 TO 921
    IF (IJ.EG.29) GD TD 822
    1= (1J.EG.30) GO TO 323
    IF (IJ.EG.31) GO TO 824
    IF (IJ.EQ.32) 60 TO 325
    IF (IJ.EQ.33) GO TO 826
1F (IJ.EQ.34) GO TO 827
    I=(IJ-EQ-341) 60 TO 330
    I= (IJ.EQ.35) GD TO 328
    I= (IJ.EQ.36) G0 T0 329
    I=(IJ.ER.37) 60 TO 340
I=(IJ.ER.38) 60 TO 341
    IF (IJ.EQ.411) GO TO 411
I= (IJ.EQ.412) GO TO 412
    IF (IJ.EG.413) 50 TO 413
    IF (IJ.EG.414) 30 TO 414
32C F(5) =- (XCEND-CAVLEN)
    F(7) = -(YCEND+YUPPER)
    I.J = 29
    YXS(1) = X(1) + DELT(5,1)
    30 TO 815
321 ANPEXCEND
    ANP7=YCEND-YUPPER
    IJ = 29
    YXS(1) = X(1)-DELT(5,1)
    30 TO 815
322 P(5.1) = (ANP-XCEND) / (2.+DELT(5.1))
    ANGT=YCEND-YUPPER
    P(7+1) = (ANP7-ANQ7)/(2**05_T(5+1))
YXS(1) = X(1)
    YXS(2) = K(2) + DELT(5+2) + ABS(X(2))
    IJ = 30
    33 TO 815
323 ANP=XCEND
    ANP7=YCEND-YUPPER
    YXS(2) = X(2)-DELT(5.2)+A3S(X(2))
    IJ = 31
    30 TO 315
824 P(5+2)=(ANP-XCEND)/(2+DELT(5+2)+ABS(X(2)))
    ANDTEYCEND-YUPPER
    P(7.2) = (ANP7-ANG7)/(2.*DELT(5.2)*43S(X(2)))
    YXS(2) = X(2)
    IJ = 32
    YXS(3) = X(3) + 0ELT(5 + 3) + X(3)
    30 TO 915
825 ANP=XCEND
    FREGUY-CHROYERER
    YXS(3) = X(3) - OELT(5,3) + X(3)
    LJ = 33
    33 13 915
826 P(5,3)=(ANP-XCEND)/(2.*DELT(5.3)*X(3))
    ANDT=YCEND-YUPPER
    P(7.3) = (ANP7-ANG7)/(2.+DELT(5.3)+x(3))
    IJ = 34
    YXS(3) = X(3)
    YXS(4) = X(4) + DELT(5,4) + ABS(X(4))
    30 10 315
827 AMPEXCEND
```

```
ANPTEYCEND-YUPPER
      YXS(4) = X(4) - DELT(5+4) + ABS(X(4))
      IJ=341
      SJ TO 315
  350 CONTINUE 2(,,4)=(AN2+XCEND)/(2.+DELT(5.4)+AB3(X(4)))
      ANGT=YCEND-YUPPER
      P(7.4) = (AVP7-AV37)/(2.+DE_T(5.4)+48S(X(4)))
      YXS(4) = X(4)
      YXS(5) = X(5) + DELT(3,5)
      IJ = 35
  33 TO 915
325 ANPEXEEND
      ANP7=YCEND-YUPPER
      1x515) = 4(5)-DE_T(3,5)
      IJ =35
30 FO 915
  329 P(5+5)=(AYP-XCEND)/(2+*DE_T(5+5))
      ANGTEYCEND-YUPPER
      ?(7.5) = (ANP7-AN27)/(2.40E_T(5.5))
      YXS(5)=X(5)
      YXS(6)=X(6)+DELT(5+6)
      IJ=37
      30 TO 915
  3+C AMPEXCEND
      AVP7=YCEND-YUPPER
      * 45(6) = X(5) - 0 ELT (5+5)
      IJ=38
      50 TO 815
  841 P(5,6)=(AVP-XCEND)/(2.+OELT(5,6))
      ANGTEYCEND-YUPPER
      P(7,6) = (ANP7-AN37)/(2.+3E_T(5,6))
      YXS(6)=X(6)
      13=411
      YXS(7)=X(7)+DELT(5+7)+ABSX7
      30 TO 815
  ALL AVPEXCEND
      REGENT-CHECKET
      [J=412
      YXS(7)=X(7)-DELT(5+7) + ABSX7
      30 TO 915
  412 P(5.7) = (ANP+XCEND)/(2.+DELT(5.7) +ABSX7)
      ANG7=YCEND-YUPPER
      P(7,7)=(AVP7-ANQ7)/(2.+DELT(5,7)+ABSX7)
      YXS(7)=X(7)
      IJ=413
      YXS(8)=X(3)+DELT(5.3)
      30 TO 315
  413 ANP=XCEND
      ANPTEYCEND-YUPPER
      IJ=414
      YXS(8)=X(3)-DELT(5.3)
      30 TO 515
  414 P(5+8)=(ANP-XCEND)/(2.+DELT(5+8))
      ANGT=YCEND-YUPPER
      P(7,8)=(ANP7-ANQ7)/(2.+DELT(5,8))
      1x5(8)=x(3)
LJ=40
  850 CALL OFSI45(ANSS)
```

```
IF(IJ-EQ-40) 60 TO 851
    IF ([J.E3.41) 30 TO 352
    IF(IJ-EQ-42) GO TO 353
    IF (IJ.EQ.43) GO TO 354
    IF(IJ.EQ.44) GO TO 355
I=(IJ.EQ.45) GC TO 356
    IF(IU-E2-45) 30 TO 357
    IF(IJ-EQ-47) 60 TO 358
    LF (IJ.E3.48) GO TO 359
    IF(IJ.EQ.49) 30 TO 860
    L=(IJ.EQ.50) GO TO 351
    IF(IJ.EG.51) GC TO 352
IF(IJ.EG.52) SO TO 553
    IF (IJ.EQ.415) 30 TO 415
    if (IJ.EQ.416) 30 TO 416
    IF (IJ.EG.417) 30 TO 417
    IF (IJ.EG.418) GO TO 415
351 F(6) =- (ANS5-61GS2)
    IJ=41
    YXS(1)=X(1)+DELT(6+1)
    30 TO 350
852 ANPEANSS
    13=42
    YXS(1)=X(1)-DELT(5.1)
    30 TO 950
353 2(6.1)=(AN2-ANS5)/(2.+DE_T(5.1))
    YXS(1)=X(1)
    IJ=43
    YXS(2)=X(2)+DELT(5+2)
    30 TO 950
SSA ANPEANSS
    [J=44
    1XS(2)=X(2)-JELT(5+2)
    30 TO 850
355 P(6.2)=(ANP-ANS5)/(2.*DELT(5.2))
    LJ=45
    *xS(2)=x(2)
    YXS(3)=X(3)+DELT(5+3)
    33 TO 850
135 AVPEANS5
    13=46
    YXS(3)=X(3)-DELT(6+3)
    50 TO 950
357 P(6.3)=(ANP-ANS5)/(2.+DELT(5.3))
    13=47
    YXS(3)=X(3)
    YXS(4)=X(+)+DELT(5+4)
    30 TC 850
959 ANPHANSS
    LJ=48
    YXS(4)=X(4)-DELT(5+4)
    30 TO 350
359 P(6.4)=(AYP-ANS5)/(2.+DELT(6.4))
    LJEGB
    YXS(4)=X(4)
    YXS(5)=X(5)+DELT(6+5)
    30 TO 850
350 AVPEANSS
    IJ=50
    YXS(5)=X(5)+DELT(6+5)
```

```
33 10 950
  851 P(6.5)=(ANP-ANS5)/(2.+DELT(5.5))
      YXS(5)=X(5)
      YXS(6) = X(6) + DELT(6.5)
      IJ=51
      30 00 850
  852 ANP=ANS5
      YXS(6)=X(5)-DELT(5,5)
      1J=52
      33 TO 850
  363 P(6,6)=(AYP-AYS5)/(2.+DELT(6,6))
      YXS(6)=X(5)
      YXS(7)=X(7)+DELT(5.7)+ABSX7
      IJ=415
      33 TO 350
  415 ANF=ANS5
      YXS(7)=X(7)-DELT(6+7)+A5SX7
      IJ=415
      30 TO 350
  416 P(6.7)=(AVP-AVS5)/(2.+DELT(5.7)+ABS(7)
      YXS(7)=X(7)
      YXS(8) = X(9) + DELT(6,3)
      IJ=417
      33 TO 850
  117 ANP=ANS5
      YXS(8)=X(3)-DELT(5.3)
     IJ=413
      GO TO 850
  418 P(6.8) = (ANP-ANS5)/(2.+DELT(5.8))
      YXS(8)=X(8)
2----F(8)------
     SID=SIN(DELTA)
     COD=COS(DELTA)
     CSA=YKS(4)+SID+YXS(7)
     CSE=YXS(4)+COD
     JSA=YXS(4)+SID-YXS(3)
     DSB=YXS(4)+COD
     25A2=25A++2
     CS82=CS8++2
     JSA2=JSA++2
     1582=158**2
     PJ1=YXS(4) + CCD-2.+YXS(7) + SID + CCD
     991=CSA2+CSB2
     PU2=YXS(4)+000-2.+YXS(8)+SID+C00
     P32=3542+3532
      ?CRD=SiRT((CSA2+CSB2)/(DSA2+DSB2))
     ACD=ALOG(RCRD)
     SITC=ATAN(CSB/CSA)
     SITD=ATAN(DSB/DSA)
     OFIZ+IA == CTIZ (.0.TL. GTIZ) IF
     SCD=SITC-SITD
     F(8)=-(COD+ACO+SID+SID)/PAI-SIN(ALFAI+YXS(5))/COS(YXS(5)+GAMMA)
     ?(8.1)=0.
     P(8,2)=0.
     P(8+3)=0.
     P(8,4)=(PJ1/P81-PU2/P32)/PAI
     2(8,5)=-C3S(ALFA1+G444A)/C3S(YXS(5)+G444A)++2
     P(3.6)=0.
     P(8+7)=YXS(7)+COS(DELTA)/(PAI+(CSA2+CSB2))
     2(8+8)=-Y45(8)+C35()E_TA)/(2AI+(35A2+3882))
```

```
NCAV1=NCAV+1
     33 253 ICV=1.VCAV1.2
253 WRITE(6+252) CAVX(ICV)+CAVY(ICV)
232 FORMAT(10x++CAVx=++F10+5+5x++CAVY=++F10+5)
    00 129 ITX=1.8
129 ARITE(6+131) ITX+=(ITX)
151 FORMAT(1X+24F6+11+24)=+214+7)
    00 132 IUP=1.8
132 HRITE(6+133) TUP+ (P(IJP+JUP)+JUP=1+8)
133 FORMAT(1X+2HP(+I1+4++J)=+8(E13+5+1X))
335 CONTINUE
     CALL DETERM(P+6+DETBD)
20 25 IDET=1+8
     DD 26 LPG=1+8
Q(LPG+IDET)=P(LPG+IDET)
 25 P(LPG.1DET)=F(LPG)
     CALL DETERM(P+8+DETE)
     IF(IDET.EQ.1) DELB=DETE/DETBD
IF(IDET.EQ.2) DELD=DETE/DETBD
     IF(IDET.EQ.3) DELD=DETE/DET30
IF(IDET.EQ.4) DELE=DETE/DET30
     IF(IDET.E3.5) DELF=DETE/DETBO
I=(IDET.E3.5) DELG=DETE/DETBO
     IF (IDET-E2.7) DELA=DETE/DETBO
     IF(IDET.EQ.8) DELI=DETE/DETBO
     33 27 LPG=1+8
 27 P(LPG.IDET)=Q(LPG.IDET)
 25 CONTINUE
     X(1)=X(1)+DELB
     X(2)=X(2)+DELC
     x(3)=x(3)+3EL3
     X(4)=X(4)+DELE
     X(5)=X(5)+3ELF
     X(6)=X(6)+DELG
     X (7) = X (7) + 3 EL 4
     113G+(8)x=(8)x
     30 50 LMM=1.8
 40 HRITE(5,61) L4N,X(L44)
 51 FDRMAT(1x+24x(+11+24)=+E14+7)
     43S3=43S(JE_8/X(1))
     ABSC=ABS(DELC/X(2))
     ABSD=ABS(DE_D/X(3))
     ABSE=ABS(DELE/X(4))
     43SF=48S()E_F/X(5))
     A3S3=43S(3ELG/X(6))
     ASSHEABS(DELH/X(7))
     ((8)X/IJEC)264=I26A
     <= ID=0
     IF(ABSB.LT.STOL) (EID=1
IF(ABSC.GT.STOL) KEID=0
    IF(ABSC.GT.STOL) (£13=0

IF(ABSC.GT.STOL) (£13=0

IF(ABSC.GT.STOL) (£13=0

IF(ABSC.GT.STOL) (£13=0

IF(ABSC.GT.STOL) (£13=0

IF(ABSC.GT.STOL) (£13=0

IF(ABSC.GT.STOL) (£13=0
     IF (KEIO.E2.1) 60 TO 35
     I=I+1
     WRITE(6.42) I
 $2 FORMAT(20x,14HITERATION NO.=,12)
```

```
IF(I.EQ.M) 30 TO 35
30 TU 55
35 IF(I+22+M) 30 TO 36
  GD TD 38
36 #RITE(5+37)
57 FORMATCIX+34HOXENEW DID NOT CONVERSE WITHIN 1917
IF (X(7)+ST+SI7) X(7)=SI7
   L=(x(1).LT.SI1) x(1)=SI1
   SI10=x(1)+2.+0G
   I=(x(2).LF.SI10) x(2)=SI10
   SI 11 = x ( 2) + 2 . + DG
   I=(x(3)._T.SI11) x(3)=SI11
  IF(X(5)-LE-10-E-3) X(5)=10-E-3
   I=(x(4).LT.SIS) x(4)=SI6
   SI5=(.5=PAI-GAMMA)+(1.-.02)
   I=(x(5).LT.0.) GO TO 51
I=(x(5).GT.SI5) x(5)=SI5
   33 13 82
31 IF(ABS(X(5)).GT.SI5) X(5)=-SI5
BUVITACO SE
                                            )2211+6(ETIR# ).0.EL.)7(X( FI
          ) +----+ X2(.TAMROF 2211
38 RETURN
   EVD
```

```
SUBROUTINE OFSIMICANS+NOF+XCA)
     DIMENSION XST(8)
     COMMON YCCC+SBETA2
     COMMON XITH(200) + XITH(200) + ANSG2S(200) + SARC2(208)
     COMMON CAVX(100),CAVY(100),BETAB,BETAC,XCCC,NCAV,LPMM,NS2
     CODISSIATER CCC1324ATEBR CCC134ATER VEHOV, SAFZIR CODISLA VCPPC
     COMMON FLAPAN DELTA DO SAP ALFAI GAMMA
                   SBETA .XX4. ICPI. SARCOD (513)
     VCPPCS
     COMMON IDUL, XA, XB, XC, TANG, EP, YC, YR, JBIGS, XLBISS, BIGS, SMALS, DSS
     .(B) VZX VOPMCD
                            J_E,ERC,YYY,XM,ITERA,SXSIO(8),SXSIOO(8),YXS(8)
     COMMON PSIZ.LP.SARC(513).SARCO(513).LPM.DE
     COMMON BETAN (513) + BETAM (513) + IJ + LPK + XII(200) + XJJ (200) + XOX
     CCCC+EESE+AASA+GVLCRX VOPPCC
     COMMON AAAA, BBBB, CCCC, A8, B6, C8, D8, T3 AUS(100), #GAUS(100), NGAUS
    COMMON/SPC/ESPACE
            = C CALLED FROM FIINT.

= 1 CALLED FROM FIINT.

= 2 CALLED FROM RIVE FOR IMAG. PART.

= 3 CALLED FROM CAVITY OXFNEW AT F(5)
     NOF
    NOF
     NOF
     VOF
     F (ICPI.E2.0) 60 TO 9
     00 10 IG = 1.8
 10 XST(I2) = XSN(I2)
  30 TO 12
9 00 11 IH = 1+8
 11 \times ST(I+) = Y \times S(I+)
 12 CONTINUE
     IF (ITERA-E2-1) 30 TO 222
     GO TO 223
222 33 224 ILK = 1,LPM
224 BETANCIL() = SBETA
3LVITNCS ESS
    CSPACE = (1.+xST(1))/FLDAT(_PK)
FSPACE = CSPACE/FLDAT(LPM-LPK)
     _283=_24-3
     XBET = -1.+CSPACE*FLGAT(LPK-1)
    xSI1=-1.+CSPACE
    3E1 = 3ET4 (2)
    A^{2}1 = (XSI1-XST(2))/((XSI1+1.)+(XST(1)-XSI1)+(XSI1-XST(3)))
    APIS = SQRT(API)
    F3 = 351+421S
    xx1 = xST(4)+SIV()E_T\\
YY1 = xST(4)+SIV()E_T\\
YY1 = xST(4)+SIV()E_T\\
     7712 = YY1**2
    PLM = XSI1 -XX1
     PLM2 = PL4++2
    P_44 = PL42+YY12
    PASR = PLM/PLMA
    PKSI = YY1/PLMA
     IF(NOF.EQ.1) F3 = F3+PXSR
    I=(V0F+EG+2) F3 = F3+2XSI
I=(V0F+EG+3) F3=F3/(KSI1-XCA)
     ANSA=0.
     33 1 I = 2 \cdot P#3 \cdot 2
    F1 = F3
    SPACE = CSPACE
    IF (I.GE.LPK) GO TO 30
    XSI2 = -1.+SPACE+FLJAT(I)
    X313 = X512+5PACE
30 TO 31
30 SPACE = FSPACE
```

```
XSI2 = X8ET+6PACE*FLOAT(I-LPK+1)
    XSI3 = XSI2+SPACE
51 BE2 = BETAY(1+1)
   3E3 = 3E74V(1+2)

A^{2} = (xS12-xST(2))/((xS12+1+)+(xST(1)-xS12)+(xS12-xST(3)))

AP3 = (xS13-xST(2))/((xS13+1+)+(xST(1)-xS13)+(xS13-xST(3)))
    APES = SPRT (APE)
    AP3S = SQRT(AP3)
    F2 = 3E2+AP2S
    F3 = 3E3+AP3S
    HAZ = XSIZ-XXL
    4422 = 442++2
    HB = HA22+YY12
    HCR2 = HA2/HB
    HCI2 = YY1/HB
    M43 = XSI3-XX1
    4432 = HA3**2
    HJ=HA32+YY12
    GF\EAF = EFCH
GF\IYY = EIOH
   IF(NOF-EQ-1) F2 = F2+4CR2

IF(NOF-EQ-1) F3 = 73+4CR3

IF(NOF-EQ-2) F2 = F2+4CI2

IF(NOF-EQ-2) F3 = 73+4CI3

IF(NOF-EQ-3) F2 = F2/(XSI2-XCA)
    L=(NO=.EQ.3) F3 = =3/(XSI3-XCA)
    FSU4 = (F1+4.*F2+F3)*SPACE/3.
    ANSA = ANSA+FSUM
 1 CONTINUE
    $31 = $3RT((-1.-X$T(2))/(-1.-X$T(3)))
    532 = 53AT(XST(1)+1.)
    SG3 = SGRT((XST(1)-XST(2))/(XST(1)-XST(3)))
    AVT1 = BETAVELD +2. +52RTECSPACED +521/502
    ANT2 = BETAN (LPM) = 2. +SQRT (#SPACE) +SQ3/SQ2
    APLA = -1.-XX1
    APLA2 = APLA++2
    A^2L3 = XST(1)-XX1
    A2L32 = A2.3**2
    I=(NOF.EG.1) ANT1 = ANT1+APLA/(APLA2+YY12)
   I= (NOF.EG.2) ANT1 = ANT1*YY1/(APLA2*YY12)
IF (NOF.EG.1) ANT2 = ANT2*APLB/(APLA2*YY12)
I= (NOF.EG.2) ANT2 = AVT2*APLB/(APLA2*YY12)
I= (NOF.EG.3) ANT1 = ANT1*(I=-KCA)
   1= (NOT-E2.3) ANT2 = ANT2/(XST(1)-X3A)
ANS = ANSA+ANT1+ANT2
    RETURN
    EVO
```

```
SJBROJTINE OFSIM2(AVS2)
   DIMENSION x(3) +x1T(3) + YY(3) + X1TC(3) + EXU(3) + FCN3(3) + KST(3)
   COMMON YCCC. SBETAS
   COMMON XITM(200) + XITM(200) + ANSG2S(200) + SARC2(200)
   COMMON CAVX(100)+CAVY(100)+BETAB+BETAC+XCCC+NCAV+LPMM+NS2
   COOL)SYATER (OCL)SYATER (OCL)MATER YEARS PRESIDENCE OCL) WAS A VORMON
   COMMON FLAPAN DELTA DGAP + ALFA1 + GA44A
                 SBETA, KKM, ICPI, SARCOD(513)
   VCPPCS
   COMMON IDUL+XA+XB+XC+TANG+EP+YC+YR+JBIGS+XLBIGS+BIGS+SMALS+DSS
COMMON SXY(B)+ SIE+ERC+YYY+XM+ITERA+SXSIO(B)+SXSIO(B)+XXS(B)
   COMMON PSIZALPASARCESISAARCOCEISA, LPMADE
   COMMON BETAN(513) + BETAM(513) + IJ + LPK + XII(200) + XJJ(200) + XOX
   COSO.EESE.AASA.GRUCAX NOPPCO
   COMMON AAAA, BBBB, CCCC, AB, BB, CB, DB, T3AUS(100), LGAUS(100), NGAUS
   SCARGE VORPECS
   DD 13 I6=1.3
13 XST(15)=YXS(16)
   PAI=3.141592653
   CCC1=ALOG(1.+XST(6))/(2.+PAI)
   JJ2=CJS(A_FA1+GAMMA)/COS(XST(5)+GAMMA)/ESPACE
   XKKK=ALOG(UU2)
   CSPACE=(1.+ XST(1))/FLDAT(_PK)
   tcsaac=0.5+csaacE
   FSPACE=CSPACE/FLOAT(_PM-LPK)
   HFSPAC=0.5+FSPACE
   X3ET=+1.+CSPACE+FLOAT(LPK-1)
   COE=COS (DELTA)
   SDE=SIV(DELTA)
   34=xST(1)-xST(4)+SDE
   33=XS[(4)+0]E
   P=P=CDE/(GA++2+GB++2)
   FCN3(3)=DGAP*PPP*XST(1)/(PAI*SQRT(1.*XST(6)))
   LPKI=LPM-LPK+1
   33 1 [P=1+_PM
   I=(IP.EQ.1) GO TO 2
   HSPACE=HFSPAC
   SPACE=FSPACE
   IF (IP.GT.LPKI) GO TO 30
   X(1)=XST(1)-SPACE+FLJAT(IP-2)
   X(2)=X(1)-HSPACE
   X(3)=K(1)-5PAZE
   30 TO 31
30 HSPACE=HCSPAC
   SPACE=CSPACE
   X(1) = XBET-SPACE + FLOAT (IP-LPKI-1)
   X(2)=X(1)-HSPACE
   X(3)=X(1)-SPACE
31 FCN3(1)=FCN3(3)
   ¥<=3
   IF (IP.EG.LPM) NK=2
   > V+S=1 6 CC
   IF(IJ.EQ.407) 60 TO 7
   IF(IJ.E2.408) GO TO 7
   IF(IJ.EQ.409) GD TO 7
   I=(IJ-EQ-410) 60 TO 7
   I=(IJ.GE.23) 60 TO 3
   60 TO 7
 3 IF(I.E2.2) XIT(2)=XIT4(LPM-IP+1)
   IF(I.EQ.3) XIT(3)=XITV(LPM-IP+1)
   GD TO 5
```

```
7 CONTINUE
       (1)x=(1)YY
C DESIMB CALCULATE G1 .
       CALL OFSIMS(YY(I) + XITS(I) + I2 + I)
       xIT(I)=XITC(I)
       IF(IJ.EQ.18) GO TO 5
       S3 T3 5
    5 IF([.EQ.2) XITM(LPM-IP+1)=XIT(I)
IF([.EQ.3) XITM(LPM-IP+1)=XIT(I)
     5 CONTINUE
       EXU(I)=EXP(-XIT(I))
       SC=X(I)-XST(4) +SDE
       SD=XST(4)+CDE
       PXA=G3++2+33++2
DHDX=DGAP+X(I)+CDE/(PKA+PAI)
       FON3(I)=EXU(I)+DWDX/JUS
IF(X(I)+LE+0+) FON3(I)=-FON3(I)
     8 CONTINUE
I CHECK IF FONS(I) IS ALWAYS POSITIVE.
IF(IP.EG._PM) GO TO 20
       30 TO 21
   20 PPQ=CDE/((-1.-XST(4)+SDE)++2+(XST(4)+CDE)++2)
       ==3=D3AP+PP2/PAI
       FCN3(3)=FF3
   21 SUM=(FCN3(1)+FCN3(2)+4++FCN3(3))++SPACE/3+
       MLZ+SZYA=SZYA
       IF(IJ.EQ.18) SARC(LP4-IP+1)=AVS2
    30 TO 1
2 SARC(_PM)=0.
       ANS2=0.
     1 CONTINUE
C XITN(LPM) = G1 AT POINT B.
2 XINT(1)=G1 AT POINT X=1.
       XITY(LPM)=CCC1-XKKK/PAI
       XITY(1)=0.
       RETURY
       END
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SUBROUTINE OFSIM3(Y+XXII+IP+I)
      COCSDAR (8) TEX NCLENIELC
      COMMON YCCC+SBETA2
      COMMON XITY(200) + XITY(200) + ANS62S(200) + SARC2(200)
      COMMON CAYX(100),CAYY(100),BETAB,BETAC,XCCC,NCAY,LPMM,NS2
      COOL) SWATER (COO) SWATER (COC) WATER FRANKES PRINCED FOR MORMOO
      COMMON FLAPAN, DELTA, DGAP, ALFAI, GAMMA
                   SBETA + XX4 + ICPI + SARCO3 (513)
      COMMON
      COMMON IDUL. XA. XB. XC. TANG. EP. YC. YR. JBIGS. XLBIGS. BIGS. SMALS. DSS
                          CLE+ERC+YYY+XM+ITERA+SXSID(8)+SXSIDD(8)+YXS(8)
      COMMON XSN(8).
      COMMON PSIZ-LP-SARC(513)-SARCO(513)-LPM-DE
      COMMON BETAN(513)+BETAM(513)+IJ+LPK+XII(200)+XJJ(200)+XJX
      DDSD # EESE # AASA # GPUCRX POPMCD
      CDM40N AAAA, BBB3, CCCC, A8, 58, C3, D8, T3AJS(100), 4GAJS(100), NGAUS
      COMMON/SPC/ESPACE
      LATUVILLATIVOPMCS
      COMMON/CVTYL/CAVLEN.BIGS2
      FOUR INTEGRALS TO BE EVALUATED BEFORE XI IS OBTAINED.
      NOTE THAT PRIVIOUSLY ONLY ONE SINGULAR INTEGRAL WAS CALCULATED IN GCASCAD AND CASCADE.
      SEE THE NOTE OF TO 3951 FOR FOUR INTEGRALS, OUT OF WHICH
      T#O ARE OF SINGULAR TYPE.
      F CT CD (0.E3.ICDI)=I
      00 11 ISI=1.8
   11 XST(ISI)=XSN(ISI)
    30 T0 12
9 D0 13 JTJ=1.8
   (LTL) 2XY=(L1L) T2X E1
   12 PAI=3.141592653
      CCC1=ALOG(1.+XST(6))/(2.*PAI)
      SSG=SGRT(1.+XST(6))
      U2=COS(ALFA1+GAMMA)/COS(XST(5)+GAMMA)/ESPACE
      J22=U2++2
      J22I=1./U22
      THO=SSG+CAVLEN/J2+(1.-CAVLEN)
      TAUM C=ALOG(THC)
      T#1=53RT(1.-(1.-XST(6)-J22I)*CAVLEN)
      TAUW1=ALOG(TH1)
      DEUATEMBAT (D.EE.UATE) FI
      IF CJTAJ-EG-1) TAJH=TAUH1
2----FIRS I1-----
      IF (ITERA-ED-1) GD FD 60
      30 TO 61
   SO CONTINUE
      33 62 IZU = 1+LP4
      BETANCIZU) = SBETA
      ATEGS = CUSIDPATE
   52 CONTINUE
   SI CONTINUE
      CSPACE=(1.+ XST(1))/FLOAT(LPK)
      HCSPAC=0.5+CSPACE
      FSPACE=CSPACE/FLOAT(_PM-LPK)
      HFSPAC=0.5+FSPACE
      X3ET=-1.+CSPACE+FLOAT(_P(-1)
      AB2=S3RT(XST(1)+1.)
      A33=S3RT((1.+Y)+(XST(1)-Y))
      A36 = .SQRT((XST(3)-Y)/(XST(2)-Y))
      A33 = A33+436
      IJ2=LP4-IP+1
      103=1
```

```
IF(I.E2.3) IJ3=_PM-I*+1
IF(I.E2.8) IU3=IP
   BEC=BETAN(IJ3)
   IF (I.EG.2) BEC=BETA4(IU2)
   FAA=BEC/A33
   L>41=_>4-1
   30 1 IW=2+LPM1
   SPACE=CSPACE
   IF(IW.GT.LPK) 60 TO 45
   XSK=-1.+SPACE+FLOAT(I#-1)
   SO TO 46
45 SPACE=FSPACE
   XSK=XBET+ SPACE+FLOAT(IN-LPK)
46 IF(I.EQ.2) GO TO 6
   IF(ImeEQeIJ3) GD TO 1
 6 FS=SQRT((1++xSK)+(xST(1)=xSK))
   FSA1 = SQRT((xST(3)-(5K)/(xST(2)-xS())
FS = FS+FSA1
   FA(IW)=(BETANCIW)/FS+FAA)/(XSK-Y)
 I CONFINUE
   I=(1.E0.2) GO TO 30
   XP1=-1.+HCSPAC
   XP2=XP1+CSPACE
   XP4=XST(1)-HFSPAC
   XP3=XP4-FSPACE
   FS1=BETAM(1)/ SQRT((1.+xP1)+(xST(1)-xP1))
FS2=BETAM(2)/ SQRT((1.+xP2)+(xST(1)-xP2))
   FS3=BETAM(LPM-2)/ SQRT((1**xP3)*(XST(1)-XP3))
FS4=BETAM(LPM-1)/ SQRT((1**xP4)*(XST(1)-XP4))
   FSA1 = SQRT((xST(2)+xP1)/(xST(3)+xP1))
   #$A2 = SQRT((XST(2)-KP2)/(XST(3)-KP2))
   FSA3=SQRT((KST(2)-K23)/(KST(3)-K23))
   FSA4=SQRT((xST(2)-x24)/(xST(3)-xP4))
   FS1=FS1+FSA1
   FS2=FS2+FSA2
   FS3=FS3+FSA3
   FS4=FS4+FSA4
   ==1=(=$1-FAA)/(X=1-Y)
   # 2= ( # 32 - # AA) / (X P2 - f)
   #P3=(#$3-#AA)/(XP3-Y)
   =>4=(=$4==AA)/(X>4=Y)
   IF (IU3.EQ.2) GO TO 21
   I=(IJ3.EQ.LPM1) G0 T0 22
   IF(IU3.EQ._PK) 30 TO 51
FA(IU3)=0.5+(FA(IU3-1)+FA(IU3+1))
   30 TO 30
51 BETC=2.*BETAN(LPK)-BETAN(LPK+1)
   XJA=X3ET-FSPACE
   FPW=BETO/SQRT((1.+xDA)+(xST(1)-xOA))
   FPHA = SGRT((XST(2)-XJA)/(XST(3)-XJA))
   FLP4=(FPa-FAA)/(XOA-Y)
   FA([U3)=0.5*(FA([J3+1)+FLPK)
   30 TO 30
21 FA(IJ3)=(FP1+FP2)/2.
   GO TU 30
22 FA(1U3)=(FP3+FP4)/2.
30 XI=0.
   LPM3=LPM-3
   SPACE=CSPACE
```

```
03 15 JA=2.LPM3.2
    IF(JA-GE-LP() SPACE=FSPACE
 15 XI=XI+(FA(JA)+4.+FA(JA+1)+FA(JA+2))+SPACE/3.
    I=(I.E2.2) 30 TO 35
XI23=0.5*4CSPAC*(FP1*FA(2))*(FA(LP4-1)*FP4) *0.5*4FSPAC
    XKI=41.
    4J=39
    LPMA=LPM-5
    IF(IUS-GE-LPMA) XKI=201.
    IF(IU3.GE.LPMA) KU=199
    30Z=(3ETAM(1)-BETAN(1))/X(I
    INXY (CIMPA)PATER-(P9_)VATER)=YCE
    H=F=H=SPAC/XKI
    AFH=HISPAC/XKI
    FT3=FP1
    = J3=F>4
    X14=0.
    xI1=0.
    JJ 202 IT4=1.4U.2
    FT1=FT3
    FJ1=FJ3
    XM2=XST(1)-HFSPAC+HFF+FLOAT(ITM)
    x43=x42+H==
    XT2=-1.+HCSPAC-HFH+F_DAT(IT4)
    XT3=XT2-H=+
    BETA2=BETA4(LPM1)+BJY+FLOAT(ITM)
    SETA3=BETA2+BOY
    ETT2=8ETAM(1)-802+F_DAT(IT4)
    SETT3=BETT2-BOZ
    FS2=6ETA2/SQRF((1.+x42)+(xST(1)-x42))
    FS3=8ETA3/SQRT((1.+x43)+(XST(1)-X43))
    FV2=8ETT2/SGRT((1.+xf2)+(xSf(1)-xf2))
    FV3=55TT3/S2RT((1.+x[3)+(XST(1)-XT3))
   FS2A = SQRT((XST(2)-XM2)/(XST(3)-XM2))
    =S3A = SQRT((XST(2)-(43)/(XST(3)-X43))
    FV2A = SGRT((XST(2)-XT2)/(XST(3)-XT2))
    F/3A = SQRT((XST(2)-XT3)/(XST(3)-XT3))
    FS2 = FS2+FS2A
    FS3 = FS3+FS3A
    F/2 = F/2+F/24
    FV3 = FV3+FV3A
    FJ2=(FS2-FAA)/(XM2-Y)
   FJ3=(FS3-FAA)/(XM3-Y)
   FT2=(FV2-FA4)/(XT2-Y)
    FT3=(FV3-FAA)/(4T3-f)
    XI4=XI4+HFF+(FU1+FU2+4++FU3)/3+
232 XI1=X[1+HF++(FT1+FT2+4++FT3)/3+
    XA4=BETAN(LPM)+2.+SQRT(HFF)/(AB2+(XST(1)-Y))
    xA4A = SQRT((xST(2)-xST(1))/(xST(3)-xST(1)))
    X44 = X44+X44A
    XI4=XI4+XA4
    XA1=BETAV(1) +2.+S3RF(HFH)/(432+(-1.-Y))
    xA1A = SGRT((xST(2)+1.)/(xST(3)+1.))
    xA1 = XA1+XA1A
    XII=XII+XAI
    XI=(XI+XI23+XI1+XI4)+AB3/PAI
    XI=XI+BEC+ALOG((XST(1)-Y-HFF)/(1.+Y-HFH))/PAI
    XXI1=-XI
    30 TO 36
```

35 XR1=-1.+0.5+HCSPAC

```
xR2=XR1+MCSPAC
XR4=XST(1)-0.5+HFSPAC
xR3=XR4-HFSPAC
FT1=0.5+(3ETAN(1)+9ETAM(1))/ SQRT((1.+xR1)+(xST(1)-xR1))
FT2=0.5+(3ETAM(1)+BETAN(2))/ SGRT((1.+xR2)+(xST(1)-xR2))
FT3=0.5+(3ETAM(.2M-1)+BETAM(.2M-1))/ SGRT((1.+xR3)+(xST(1)-xR3))
FT4=0.5*(BETAM(LPM-1)+BETAN(LPM))/ SQRT((1.+x74)*(xST(1)-xR4))
=T14 = SQRT((XST(2)-(R1)/(XST(3)-XR1))
FT2A = SGRT((xST(2)-xR2)/(xST(3)-xR2))
FT3A = SQRT((xST(2)-xR3)/(xST(3)-xR3))
=T4A = SQRT((xST(2)-(74)/(xST(3)-474))
FT1 = FT1+FT1A
FT2 = FT2+FT2A
FT3 = FT3+FT3A
=T4 = FT4==T4A
FR1=(FT1-FAA)/(XR1-Y)
FR2=(FT2-FAA)/(XR2-Y)
FR3=(FT3-FAA)/(XR3-Y)
FR4=(FT4-FA4)/(XR4-Y)
x1P1=3.5.4CSPAC+(FR1+FR2)+0.5+HFSPAC+(FR3+FR4)
XIP2=0.25+HCSPAC+(FR2+FA(2))+0.25+HFSPAC+(FA(LPM-1)+FR3)
XI23=XI21+XIP2
X41=21.
X412=42.
41=21
M2=MU-2
_ ? 44 = _ ? 4 - 5
IF(IU2.GE.LPMA) XMI=101.
I=(IU2.GE.LPMA) X412=202.
If (IU2.GE.LPMA) MU=101
I = (IU2.6E._PMA) M2=4J-2
SETY=(SETAV(LPM)-SETA4(LPM-1))/KMI2
BESS=0.5+(BETAN(LPM)+BETAM(LPM-1))
HSPS=0.5+HFSPAC/X4I
FR3=FR4
32TY1=(9ETAM(1)-BETAN(1))/XMI2
((1)MAT36+(1)PAT36)+8.0=1223E
HSPS1=0.5+HCSPAC/XMI
F231=F31
XI 1= 0 .
XI4=G.
20 129 IL=1.M2.2
F21=F23
F311=FQ31
x2=xST(1)-HSP6+FLJAT(MU-IL)
x3=x2+45P5
X21=-1.+HSP61+FLOAT( 4U-IL)
x31=x21-H5261
BETA2=BESS+BETY+FLOAT(IL)
BETA3=BESS+BETY+FLOAT(IL+1)
95TA21=9E$$1-9ETY1+=_DAT(IL)
BETA31=BETA21-BETY1
FJ21=3ETA21/ SQRT((1.+X21)+(XST(1)-X21))
FJ31=3ETA31/ SQRT((1.+X31)+(XST(1)-X31))
FJ21A = S2RT((X5T(2)-X21)/(XST(3)-X21))
FU31A = SQRT((XST(2)-X31)/(XST(3)-X31))
FJ21 = FU21+FU21A
FJ31 = FJ31+FJ31A
F221=(FU21-FAA)/(X21-Y)
F931=(FJ31-FAA)/(X31-Y)
```

```
FU2=8ETA2/ SQRT((1.+x2)*(xST(1)+x2))
FJ3=8ETA3/ SQRT((1.+x3)*(xST(1)-x3))
      = SQRT((XST(2)-X2)/(XST(3)-X2))
      = J34 = SQRT((xST(2)-x3)/(xST(3)-x3))
      FJ2 = FJ2+FJ2A
      FU3 = FU3*FU3A
      FQ2=(FU2-FAA)/(X2-Y)
      FQ3=(FU3-FAA)/(X3-Y)
      XI1=XI1+ASP61+(FQ11+F421+4++F431)/3.
  129 XI4=XI4+HSP5+(FQ1+4++FQ2+FQ3)/3+
      XIA=2. + SGRT(HSP5) + BETAN(LPM) / (AB2+(4ST(1)-Y))
      xIAA = S2RT((xST(2)-xST(1))/(xST(3)-xST(1)))
      XIA = XIA+XIAA
      XI4=XI4+XIA
      XIB=2.*SQRT(HSP61)*3ETAN(1)/(AB2*(-1.-Y))
      XI3A = SGRT((XST(2)+1)/(XST(3)+1.))
      AEIX+BIX = BIX
      XI1=XI1+XIB
      xI=(x1+xI1+xI23+xI4)+A33/P4I
      XI=XI+BEC+ALOG((XST(1)-Y-HSP6))/(1.+Y-HSP61))/PAI
      xxI1=-xI
  36 CONTINUE
]-----I2-----
C----SINGULAR INTEGRAL.
      BUT THIS IS TREATED AS A SINGULAR INTEGRAL ANYWAY
      ISIC=3
      XCA=Y
      CALL ICE(SR.SM.XCA.ISIC)
      K(12=53
      ARGL=(XST(1)
                       -Y)/Y
      If (ARGL.T.G.) ARG.=-ARGL
      XXI2=XXI2=A33+ALGG(ARGL)
      xx12=-xx12
:----I3-----
     JSE CHEBYSHEV-GAUSS QUADRATURE.
AU(I) ARE ALREADY CALCULATED IN SUBROUTINE F1INTL
AND PASSED ONTO HERE BY COMMON STATEMENT.
      XXI3 = 0.
      aPC5 = (xST(1)+xST(2))+.5
      C485 = (XST(2)-XST(1))+.5
      431 = (3PC5+1.)/CMB5
      432 = (-8°05+XST(3))/0M85
      33 120 ISJ4 = 1.NCHBY
      HA1 = 1.-AJ(ISUM)
      (MLZI)LA-SEA)+(IEA+(MUZI)LA) = SAH
      SHA2 = SQRT(HA2)
      #313 = HA1/SHA2
      F3AI3 = C495+AJ(ISU4)+82C5-Y
 120 XXI3 = XXI3+F3I3/F3AI3
      XXI3 = XXI3+PAI/NCHBY
      UU22 = CDS(ALFA1+GAMMA)/COS(XST(5)+3AMMA)/ESPACE
                          D7(TSX/)AMMAG+)5(TSX(SDC/)AMMAG+1AF_A(SOC = 22UJ
      HX3 = CCC1-ALOG(UU22)/PAI
      xx13 = xx13+AB3+AX3
     JSE CHEBYSHEV-GAUSS QUADRATURE FORMULA--
     -- BBETANZ(I) ARE ALREADY CALCULATED IN
     SUBROUTINE FIINTL AND PASSED ONTO HERE BY
```

```
COMMON STATEMENT.
      FPC5 = (XST(3)+XST(2))+.5
      FMC5 = (XST(3)-XST(2))+.5
      441 = (FPC5+1.)/F4C5
      A42 = (FPC5-XST(1))/F4C5
      XXI4 = 0.
      00 138 ISUM = 1.NCH3Y
      RAX = (BBTAY2(ISUM)+PAI)+(1.+AJ(ISU4))
      RBX = (AJ(ISU4)+A41)+(AJ(ISUM)+A42)
      SRBX = SGRT(RBX)
      RCX = RAX/SRBX
      RDX = FMC5+AJ(ISUM)+FPC5-Y
  130 \times 14 = \times 14 + RCX/RJK
      XXI4 = XXI4+PAI/NCHBY
      XXI4 = -XXI4+AB3/PAI
      3P1+=(XST(7)+1.)+.5
      3414=(xST(7)+1.)+.5
      A51=(GM1H-XST(2))/(-GP1H)
      A52=(341H-XST(1))/(-871H)
      A53=(GM1H-XST(3))/(-GP1H)
      xx15=0.
      33 7G
               ISJ4=1.VCH3Y
      F5A=SGRT(HA1/HA2)
      F5B=(-SP1H+AUCISU4)+341H)-Y
   70 XXI5=XXI5+F5A/F58
      XXIS=PAI * XXIS/NCHBY
HMFH=(XST(8)-XST(3))+.5
      HPFH=(XST(3)+XST(3))+.5
      A51=(HPFH-XST(2))/H4FH
      A52=(4PFn+1.)/HMF4
      A63=(APFH-XST(1))/H4F4
      XXI5=0.
      33 30
               ISUM=1.VCHBY
      HA1 =(1.-AJ(ISUM))+(AJ(ISUM)+A61)
HA2 =(AJ(ISUM)+A62)+(AJ(ISJM)+A63)
      FSA=SQRT(HA1/HA2)
      F58=H4F4+4J(ISU4)+#3=4-Y
   30 XXIS=XXI6+F5A/F5B
      XXIS=PAI + XXI6/NCHBY
      XXII = XXI1+XXI2+XXI3+XXI4+433+TAJ#+(-XXI5+KXI6)/PAI
      INRIT1=2
      I=RIT2=30
      IWRIT3=60
      IF (IJ-EG-18-AND-IP-EG-IHRIT1) HRITE(5-55) XXII+XXI2+XXI3 +XXI4+IP
   IF (IJ=EG=18-AND=IP=EQ=1HRIT2) #RITE(5=55) XXII+XXI2+XXI3+XXI4+IP
IF (IJ=EG=18-AND=IP=EQ=1HRIT3) #RITE(6=55) XXII+XXI2+XXI3+XXI4+IP
55 FJR4AT (10x+===11+12+13+14 JF F(4) ARE===++4(E14-7+2X)+2X+
     A = IP= + + I4)
      RETURN
      END
```

..

```
SUBROUTINE OFSIM5(AVS5)
     DIMENSION S2SR(101), 52KER(101), XST(8)
     SATBER, COOK NORMOD
     COMMON XITM(200)+XITM(200)+ANS52S(200)+SARC2(200)
     COMMON CAVX (100) + CAVY (100) + 3ETAB + 3ETAC + XCCC + NCAV + LP44 + NS2
     COMMON AU(100), ISHARP, NCHSY, BSTAN(100), BBTAN2(100), BETAN2(100)
     COMMON FLAPAN-DELTA-OSAP-ALFA1-GAMMA
                 SBETA . XXM . ICPI . SARCOD(513)
     KOMMCD
     CLE.ERC.YYY.XM.ITERA.SXSIO(8).SXSIOO(8).YXS(8)
     +(E)VEX VOPECS
      :3440N PSIZ+LP+SARC($13)+SARCO(513)+LPM+DE
     COMMON BETAN(513)+BETAM(513)+IU+LPK+XII(200)+XUU(200)+XOX
     COMMON XROUND+A2AA+3288+C2CC
     COMMON/SPC/ESPACE
     PAI=3.141592654
     THIS SUBROUTINE CALLED FROM DEFNEN.
     JSE SIMPSONTS RULE.
     33 1 143 = 1+8
   1 \times T(IMO) = YXS(IMO)
     COE = COS(DELTA)
     SDE = SIN(DELTA)
 WS2 SHOULD HAVE A FACTOR OF 4.
2 NS2=LPMM=LPM2
     VS21 = NS2+1
     VS2A = VS2-1
     S2GAP = (xST(3)-xST(2))/NS2
     JJ2 = COS(A_FA1+GAM4A)/COS(XST(5)+GAM4A)/ESPACE
                         )7(TSX/)AMMAG+)5(TSX(SOC/)AMMAG+1AFLA(SCC = 2UJ
     DD 2 IS2 = 1+NS21
     x52 = xST(2)+S23AP+(IS2-1)
     XKD = XS2*CDE
     ECC+(4) TCx-SCX = CAPX
     XMAS2 = XMAS++2
     ASD = XST(4) +CDE
     ASD2 = ASD++2
     I= (IS2.E2.1) 60 TO 3
     IF (IS2.EG. 4821) 50 TO 4
     CALL 32 (x$2.4N$32.132)
     G2 CALCULATES G2 WITH XSI GIVEN.
     E32 = EXP(-ANSG2)
     I=(IJ-E3-40) ANSG2S(IS2)=ANSG2
     S2KER(IS2) = E32+0W0X/UU2
     33 TO 2
   3 CONTINUE
     S2KER(1) = DWDX/SQRF(1.+XST(6))
     ANSG2S(IS2) = ALOG(SQRT(1.+XST(6))/UU2)
     33 TO 2
   4 CONTINUE
     S2KER(NS21) = D#DX/JJ2
     ANSS25(152)=0.
   2 CONTINUE
     S2SR(1) = 0.
     DO 10 JS2 = 1+NS2A+2
  10 S2SR(JS2+2) = S2SR(JS2)
    1+652KER6J52)+4++52KER(JS2+1)+52KER(JS2+2))+52GAP/3+
     IF(IJ.NE.4D) GO TO 48
     SARC2(1)=0.
     00 50 ISARC=2.NS2.2
```

```
30 S2SR(ISARC)=-5+(S2SR(ISARC-1)+S2SR(ISARC+1))
D3 30 ISARC=1+NS21
30 SARC2(ISARC)=S2SR(ISARC)
+0 C2NTINJE
ANS5 = S2SR(NS21)
RETJRN
END
```

```
SUBROUTINE IC2 (SR+SM+xCA+ISIC)
   DIMENSION XST(8)
   SATBER+CCC+ VCPPCC
   COMMON XITM(200) + XITM(200) + 4NSG2S(200) + SARC2(200)
   SZMADN CAVX (186) .CAVY (188) .BETAB .BETAB . KCCC .NCAV .LPMM .NS2
   COMMON AUC100)+ISHARP+NCHBY+BBTAN(130)+BBTAN2(100)+BETAN2(100)
   COMMON FLAPAN, DELTA, DSAP, ALFAI, GAMMA
                SETA+(44.10PI+SARCD3(513)
   POFFEE
   COMMON IDUL, XA, XB, XC, TANG, EP, YC, YR, JBIGS, XLBIGS, BIGS, SMALS, DSS
   COMMON XSN(B).
                      CLE, ERC, Y / Y , X M . I FERA . SXSIO(6) . SXSIOD(8) . YXS(8)
   CCMMON PSIZ+LP+SARC(513)+SARCD(513)+LPM+DE
   COMMON BETAN(513) + BETAM(513) + [J+LPK+XII(200) + XJJ(200) + XDX
   COSO+EESE+AASA+CVCCRX VOPPCO
   COMMON AAA4.BBBB.CCCC.A8.BB.CB.DB.T3AUS(100),MGAUS(100),NGAUS
   COMMON/SPO/ESPACE
   00 1 IPN = 1.8
 1 XST(IPV) = YXS(IPV)
   XX1 = XST(4)+SIN(DELTA)
   (A1_3C)2C0+(4)72x = 17Y
   YY12 = YY1**2
   ISIC = 0 FOR RHINT
        = 1 IV CAVITY OF OFSIMS FOR FEST AND IN CAVITY.
          2 CALLED FROM FIINTL FOR F(1).
          3 FOR 1.2 DF F(4).
   SR=C.
   S4=0.
   34=X$T(1)*+5
   344C=34-XST(2)
   3421=34+1.
   Enmf=BH-XST(3)
   HPFH=(XST(B)+XST(3)) +.5
   HMFH=(XST(3)=XST(3))++5
   3414=(XST(7)-1.)*.5
   3=14=(XST(7)+1.)+.5
   A51=(341H-XST(2))/(-3°1H)
   A52=(3M1H-XST(1))/(~9°1H)
   A53=(3M1H-XST(3))/(-3P1H)
   451=(4PFm-XST(2))/#4=4
   A52=(HPFH+1.)/H4FH
   453=(HPFH-XST(1))/H4FH
   311=8440/34
   312=8421/34
   313=944F/34
   IF (1510.NE.3) GO TO 20
   API=(XCA+1.) +(XST(1) - XCA) + (XCA - XST(3))
   AP2=XCA-XST(2)
   4PS=SQRT(AP1/AP2)
20 CONFINJE
   DO 7 ISUM=1.NCHBY
   RA=(AJ(ISJM)+311) +(AJ(ISJM)+1.)
   RE12 (AUCI) LA) + (SIE+(MUZI) LA) = EF
   I= (ISIC+22+5) RA=(AJ(ISJM)+1+)+(-AJ(ISUM)-A51)
   IF (ISIC.EQ.-5) R9=(AU(ISUM)+452)+(AU(ISUM)+A53)
   IF (ISIC.EG.-6) RA= AJ(ISJM)+A61)+(-AJ(ISJM)+1.)
   IF (ISIC.E3.-6) R3=(AJ(ISJ4)+A62)+(AJ(ISUM)+A53)
   SAB=SART(RA/RB)
   SAC=84+SQRT(1+-AJ(ISJM)++2)/SAB
   HE+(MUZI)LA+HE=912X
   x > x > = x S I > + x x 1
   X2X22=X2X2++2
```

RV2=x2xP2+YY12
Rd=x2xP/Rd2
Rd=x2xP/Rd2
Rd=yY1/Rd2
IF(ISIC=E0=1) RdR=1=/(XSID=KCA)
IF(ISIC=E0=2) RdR=1=
I=(ISIC=E0=3) RdR=(1=-SAC/ADS)/(XSID=XCA)
IF (ISIC=E0=-5) RdR=1=
I= (ISIC=E0=-5) RdR=1=
I= (ISIC=E0=-6) RdR=1=
SR=SR+SAD=RdR
7 SM=SM+SAD=RdR
PAI=3=141592654
SR=SR+DAI/NCHBY
SR=SR+DAI/NCHBY
RTURN
END

* *

```
SUBROUTINE FIINTL(YINT, KOTR_)
   DIMENSION XST(B)
   COMMON YCCC+SBETA2
   COMMON XITH(200)+XITH(200)+AVSG2S(200)+SARC2(200)
   COMMON CAVX(100) +CAVY(100) +BETAB +BETAC +XCCC +NCAV +LPMM+NS2
   (001)SVATEE, (001)SVATEE, (0(1)VATEE, YEHOV, SAHZI, (001)UA VOPPCC
   COMMON FLAPAN. DELTA. DGAP. ALFA1. GAMMA
                 SBETA .xx4.ICPI.SARCDD(513)
   VCPPCS
   COMMON IDUL, XA, XB, XC, TANG, EP, YC, YR, JBIGS, XLBIGS, BIGS, SMALS, DSS
                       C_E, ERC, YYY, XM, ITERA, SXSID(8), SXSIDO(6), YXS(8)
   COMMON XSN(B)+
   CO440N PSIZ+LP+SARC(513)+SARCO(513)+LPH+DE
   COMMON BETAN(513) +BETAM(513) +IJ+LPK+XII(200) +XJJ(200) +XOX
   COSO + EESE + AASA + GULCRY VCPMCC
   COMMON AAAA.BBB.CCCC.A8.BB.CS.D8.T3AUS(100). dGAUS(100).NGAUS
   COMMON/SPC/ESPACE
   SUBROUTINE FIINTL CALCULATES THE INTEGRALS IN F(1)
  ISHARP = 0 FOR SHARP L.E.FOILS.
ISHARP = 1 FOR ROUVED L.E.FOILS.
   IF FOILS HAVE ROUNDED L.E., CHEBYSHEV-GAUSS
   BLTARCALE
   QUADRATURE FORMULA CAN NOT BE USED. SINCE BETA
   *POITCHLE HICCHS A 107 21
   ACHBY = NUMBER OF CHEBYSHEV-GAUSS BLADRATURE CONTROL POINTS.
   PAI = 3.141592654
   LF([C71.E2.0) 50 TO 9
00 70 IQ=1.8
70 XST(I3) = XSN(I3)
   30 TO 12
 9 00 11 IH = 1+8
11 \times ST(I+) = Y \times S(I+)
12 CONTINUE
   341 = (XST(1)+1.)*.5
   av2 = (xST(1)-1.)+.5
   411 = (DN2-xST(2))/DN1
   112 = (DN2-XST(3))/DV1
   305 = (XST(1)+XST(2))++5
   C485=(XST(2)-XST(1))++5
   A31 = (BC5+1.)/CMB5
   432 = (-805 + XST(3))/0435
   FCA5 = (xST(3)-xST(2))+.5
   FC15 = (XST(3)+XST(2)) * .5
   441 = (FC15+1.)/FCA5
   A42 = (FC15-XST(1))/FCA5
   SPACE2 = (xST(3)-xST(2))/_P44
   READ LPMM FOR THE SECOND ARC.
   IF(KCTRL.3E.2) 30 TO 100
   IF(IJ.SE.2) GO TO 100
   CSPACE = (1.+xST(1))/FLDAT(LPC)
   FSPACE = CSPACE/FLOAT(LPM-LPK)
   I34 = 1
   x 2 n 2 K = -1 .
   SPACE=CSPACE
   20 ICHBY=1+NCHBY
   NCH=NCHBY-ICHBY+1
   AJ([C+3Y)=03S(62+4C4-1)+PAI/(2+4C4BY))
   SVC+(YEHCI)LA+1VC=12>X
   IF(ITERA-E2-1) 30 TO 488
22 IF (KCHCK-GE-XKSI) GD TO 21
   IF(IOM.GE.LPK) SPACE = FSPACE
   XCHCK = XCHCK+SPACE
```

```
LOM = 104+1
      30 TO 22
  (MCI) IZX DVA (1-MCI) IZX WIE ZIZIXZ IZXX
   21 CONTINUE
      1-PGI = AMCI
      CAMCICHBY) = BETAN(IOM)+(BETAN(IOM)+BETAN(IDMA))
     X+(XKSI-XCHCK)/SPACE
      BBTAN IS JSED FOR CHEBYCHEV-GAUSS INSTEAD OF BETAN.
      33 70 20
 433 ESTANCICHEY) = SBETA
C BETAN FOR ITERA-EQ+1 IS SPECIFIED IN OFSIM1.
   20 CONFINJE
  100 CONTINUE
      IF (KOTRL-EQ-6) GO TO 6
IF (KOTRL-EQ-5) GO TO 5
      IF(KCTRL+E4+4) GO TO 4
LF (KCTRL+E2+3) GO TO 3
      IF (KSTRL+EQ+2) GO TO 2
IF (ISHAR7+EQ+1) GO TO 10
      YINT = 0.
      25 110 ISJ4 = 1-NC+3Y
      ABC = (AU(ISUM)+A11)/(AU(ISUM)+A12)
  113 YINT = YINT +BBTAN(ISUM)+SGRT(ABC)
      YEHONNIAG*INIY = TAIY
      30 TO 1880
   10 CONTINUE
C THIS IS THE CASE OF HANDLING RNDED L. E. .
      VOF = 0
      XCA = D.
      CALL DESIMICYINTONOFOXCAD
      ACA IS DUMAY. ONLY ISED FOR F(5) INDXFNEW.
      30 TO 1000
    5 CONTINUE
      1$10=-5
      X C A = 0 .
      CAL_ IC2(SR+SM+XCA+ISIC)
YINT=SR
      30 TO 1003
    6 CONTINUE
      ISIC=-6
      XCA=0.
      DALL ICE(SR.SH.XCA.ISIC)
      YINT=SR
      30 TO 1000
    2 CONTINUE
      XCA=0.
C KIA IS DUMMY.
      ISIC=2
      DALL IC2(SR,S4,XCA,ISIC)
      YIVI=SR
      30 TO 1000
    3 CONTINUE
C----INTEGRAL FOR I3.
GARCHA CATALCALA STORED

OF THIS
      123 ISJ4 = 1.NCH3Y
      431 = 1.-AJ(ISUM)
      AB2 = (AJ(ISUM)+A31)+(A32-AJ(ISUM))
      S2A32 = S2RT(AB2)
      ABC = AB1/SQAB2
```

```
120 YINT = YINT+ABC
                       YINT = YINT*PAI/NCHBY
                      30 TO 1000
C----INTEGRAL FOR 14

C SINCE BETA(N) BTWN TCT AND TFT ARE

C EXPECTED TO BE ALMAYS SMOOTH, USE GAUSS+

C CHEBYSHEV GUADRATURE FORMULA.

C AU(N) IS ALREADY CALCULATED.

IF THIS IS THE FIRST CASE FOR BETANZ.

USE A CONSTANT FOR BETANZ.

33TAYZ IS USED FOR CHEVY-GAUSS INSTEAD OF BETANZ.
                4 CONTINUE
IF(ITERA-GE-2) SO TO 150
IF(IU-GE-2) GO TO 191
D SBETA2 MUST BE READ FOR THE FIRST RUN-
DD 160 ICHBY = 1-XCHBY
        130 35TAN2 (ICHBY) = SBETA2
                       V$21=V$2+1
                       00 185 IOC=1.NS21
       135 BETANZ(IOC)=SBETAZ
                       50 TO 131
        150 CONTINUE
                       IF(IJ.SE.2) GD TD 131
                       IOMM = 1
                       XCHCK = XST(2)
                       DO 170 ICHBY = 1.NC#9Y
                       XKSI = FCA5+AJ(ICHBY)+FC15
        152 If (xC+CK+3E+X(SI) GD TO 151
                      XCHCK = XCHCK + SPACE2
IDMM = IDMM+1
                       30 TO 152
        151 CONTINUE
                       I-PPCI = APMCI
                       (PPCI)SPATEE = (YEHDI)SPATEE
                   1+(BETAN2(IOMM)-BETAN2(IOMMA))+(KKSI-KCHCK)/SPACE2
                      ILM=ICHBY
                       KKSL = FCA5*AJ(I_4 )+FC15
                       #RITE(6.250) ILM.BSTAN2(ILM).XKSI
        250 FORMAT(15x++I=++I3+2x++BBTAN2=++E14+7+2x++X(SI=++E14+7)
       170 CONTINUE
        131 CONTINUE
                       YINT = 0.
                      TRUE TO THE TENT OF THE TENT O
                       AB2 = (AJ(ISUM) + A41) + (AJ(ISJM) + A42)
                      SGAB2 = SGRT(AB2)
         190 YINT = YINT + ABI/SQAB2
                       YINT = YINT+PAI/NCHBY
    STALLANCS OFFT
                       RETURY
                       CVE
```

Action of Spirit Company and a second

```
SUBROUTINE G2 (XS2+AG2+IS2)
                     xST(3),xI216(200),xI225(200),xI25S(200),xI24S(200)
      NCIENSION
       COMMON YCCC+SBETA2
       23MMON XITM(200) + XITM(200) + ANSG2S(230) + SARC2(200)
       COMMON CAVX(100),CAVY(100),BETAB,BETAC,XCCC,NCAV,LPMM,NS2
      COMMON AU(100) + ISHAR - + NCHBY + BBTAN(100) + BBTAN2(100) + BETAN2(100)
       COMMON FLAPANODELTAGOGAPGALFATGAMMA
      COMMON
                    SBETA . XXM . ICPI . SARCOJ (513)
      COMMON IDJL.XA.XB.XC.TANG.EP.YC.YR.JBIGS.XLBIGS.BIGS.SMALS.DSS
      COMMON XSN(8). CLE-ERC+/YY+<M+IFERA+SXSIO(8)+SXSIO(8)+YXS(8)
COMMON PSIZ+LP+SARC(513)+SARCO(513)+LPH+DE
       COMMON BETANESIB)+BETAMESIB)+IJ+LPK+XII(200)+XJJ(200)+XXX
      COMMON XROUND, A2AA, 3238, C2CC
      COMMON AAAA, BBBB, CCCC, A8, BB, CB, D8, FJAUS (100), 45AUS (100), NGAUS
      COMMON/SPC/ESPACE
       LATULILATIVEPPES
      SZEIE * MEJNADNICVTYLICALLEN * BIGSZ
      THIS SUBROUTINE IS CALLED BY DESIME.
THIS SUBROUTINE CALCULATES FUNCTION 52(XS2) WHICH
      INCLUDES I21(XS2) TO I24(XS2).
      *S2 IS XSI - AG2 IS THE SOLUTION OF INTEGRALS.
      33 1 I3P=1,3
    1 XST(I3P)=YXS(IQP)
      PAI = 3-141592654
      CCC1 = ALOG(1.+ xST(6))/(2.+PAI)
      SSG=S3RT(1.+XST(5))
      U2=COS(ALFA1+GAMMA)/COS(XST(5)+GAMMA)/ESPACE
      J22=U2++2
      U22I=1./U22
      Tad=SSG+CAVLEN/J2+(1.-CAVLEN)
      TAURD=ALDS(THD)
      Tw1=SQRT(1.-(1.-xST(6)-U221)+CAVLEN)
      TAUNI=ALOG(TH1)
      TE CUTAU-ER-OR TAUMETAUMO
TE CUTAU-ER-OR TAUMETAUMO
      IF (IJ.SE.47) GO TO 100
---- [21(XSI)----
      THE SAME INTEGRATION AS THAT IN
      SUBROUTINE CAVITY FOR GC(XSI)
      NOF = 3
      CALL OFSIM1(ANS.NDF.XS2)
      XI21 = ANS
      I^{\pm}(IJ_{\bullet}EG_{\bullet}40) xI21S(IS2) = xI21
C----122(XSI)----
      USE THE SAME SUBROUTINE ICE AS
      USED IN CAVITY WITH ISIC=1.
      ISIC=1
      CALL IC2(SR.SM.XS2.ISIC)
XI22 = SR
      NOTE THAT SM IS DUMMY VARIABLE.
      I = (IJ - EQ - 40) \times I22S(IS2) = xI22
2----123(XSI)----
      USE CHEBYCHEV-GAUSS QUADRATURE FORMULA
        IN EXACTLY SIMILAR MANNER TO THAT IN
         DESIMS FOR IS.
      X123 = 0.
      3PC5 = (XST(1)+XST(2))+.5
      CM85 = (XST(2)-XST(1))+.5
      A31 = (8PC5 + 1.)/C435
      A32 = (-BPC5 + XST(3))/CMB5
```

```
DD 2 ISUM = 1+NCHBY
      (PUZI) LA-41 = 1AH
      ((MLZI)LA-SEA)+(A31)+(A32-AJ(ISJM))
      SHAZ = SART(HAZ)
      F313 = HA1/SHA2
      F3AI3 = C485+AJ(ISU4)+8°C5-452
    2 XI23 = XI23+F3I3/F3AI3
      XI23 = XI23+PAI/NCH3Y
      I^{\pm} (IJ.EG.40) X123S(IS2) = X123
      JSE CHEBYCHEV-GAUSS BUADRATURE
         FORMULA BY ASSUMING THAT
         THE KERVEL FON. IS SMOOTH.
      HU = (XS2+1.)+(XS2-4ST(1))+(XST(3)-XS2)
      \forall x = xs2-xsT(2)
      HE = SERT(HU/HV)
      = 2C5 = (XST(3)+XST(2)) + .5
      =403 = (XST(3)-XST(2))*+5
      A41 = (FPC5+1.)/FMC5
      442 = (FPC5-XST(1))/F4C5
      XI24 = 0.
      33 10 ISU4 = 1. NCHBY
      IPA+(PUZIJUA = IACT
      TPA2 = AJ(ISUM)+A42
      SIP = SERT(TPA1+TPA2)
      F4T = (86TAN2(ISUM)+PAI)+(1.+AU(ISUM))/STP
      BETAND IS CHEBY-GAUSS VERSION FOR BETA ON THE SECOND ARC.
      F4A = F4C5+AJ(ISU4)+=2C5-XS2
      ST2 = SQRT(1.-AJ(ISJ4)**2)
=4B = F4C5 *ST2*(3ETAV2(IS2 )*241)/4#
   10 XI24 = XI24+(F4T-F43)/F4A
      XI241 = XI24+PAI/NCH3Y
      BETANZ IS USED FOR SIMPSONTS RULE.
      XLG = ALOG((XST(3)-X52)/(XS2+XST(2)))
      IS2 IS TRANSFERRED THROUGH 32-ARGUMENT.
      X1242 = XLG+(BETAN2(IS2)+PAI)/44
      XI24 = XI241+XI242
      I=(IJ-EQ-40) XI24S(IS2) = XI24
      30 TO 101
  100 xI21 = xI21S(IS2)
      x122 = x1225(152)
      x123 = x123S(1S2)
      XI24 = XIZ4S(IS2)
  131 X524 = -X[21/34[-X[22
      XS29=CCC1-ALOG(COS(A_FA1+GAMMA)/COS(XST(5)+GAMMA)/ESPACE)/PAI
           -1AP/))T(TSX/)AMMAG+)5(TSX(SDC/)AMMAG+1AF_A(SDC(GDLA-1CCC <math>= 32SX
      xS2C = xS2B * xI23
      X523 = -X124/PAI
      AG2 = (XS2A+XS2C+XS23) +H4
2 -- - 125 -----
      3-14=(XST(7)+1.)+.5
      GM1H=(XST(7)-1.)+.5
      A51=(GM1H-XST(2))/(-GP1H)
      A52=(GM1H-XST(1))/(-GP1H)
      A53=(341H-XST(3))/(-321H)
      X52E=3.
      00 20
               ISUM=1.NCHBY
      HA1 =-(1.+4)(ISU4))+(AJ(ISJ4)+451)

HA2 =(AJ(ISU4)+452)+(AJ(ISJ4)+453)
      SH12=SQRT(HA1/HA2)
```

```
HA3=-GP1H+AJ(ISUM)+341H-XS2
         F5=SH12/HA3
    20 X32E=($2E+F5
        XSZE =PAI + XSZE/NCHBY
3---I25-----
         HMFH=(XST(3)-XST(3))++5
         HPFH=(XST(8)+XST(3))++5
         A61=(HPFH-XST(2))/H4FH
         A52=(42FH+1.)/44FH
         A53=(47F4-X5T(1))/44=4
         XS2F=0.
         33 30
                      ISJM=1.NCH3Y
         HA1 = (1.-AJ(ISUM)) + (AJ(ISUM)+A61)
HA2 = (AJ(ISJM)+A62) + (AJ(ISJM)+A63)
         SH12=SGRT(HA1/HA2)
         SZX-FFFH+AJEISUM)+HFFH-XS2
         F5=$H12/443
    30 XS2F=XS2F+F6
         XS2F=PAI * XS2F/NCHBY
         AG2=AG2+(+XS2E+XS2F)+TAUH+Hd/PAI
    A32=A32+(-X52=4X52=)*(AU#H#JPAI

IF (IJ)=E9-27-AND=IS2=E9-1D) #RITE(6+52) XI21+XI22+XI23+XI24+IS2

IF (IJ)=E9-27-AND=IS2=E9-1D) #RITE(6+52) XI21+XI22+XI23+XI24+IS2

IF (IJ)=E9-27-AND=IS2=E9-3D) #RITE(6+52) XI21+XI22+XI23+XI24+IS2

52 FORMAT(10X++---II+I2+I3+I4 )F F(5) 4RE+-+++4(E14-7+2X)+2X+
       A +IS2=+,I4)
         RETURN
        END
```

```
SUBROUTINE CAVITY (XCC+YCC)
I THIS SUBROUTINE IS CALLED FROM DXFNEW FOR F(5).
      DIMENSION CKEX(100), SKEY(100), ANSI1(100), SRI2(100), SIC313(100)
      DIMENSION SIC+14(100)+XST(8)
      DIMENSION CAVEX (100) +CAVYY (100)
      COMMON YCCC+SBETA2
      COMMON XITM(200) +XITM(200) +ANSG2S(200) +SARC2(200)
      COMMON CAVX(100), CAVY(100), BETAB, BETAC, XCCC, NCAV, LPMM, NS2
      COMMON AUC100)+ISHAR?+VCH9Y+38TANC100+88TAN2C100)+8ETAN2C100)
      COMMON FLAPANADELTAADGAPAALFALAGAMMA
      VOPMCS
                    SBETA+XKM+ICPI+SARCO3(513)
      COMMON IDJL.XA.X3.XC.TANG.EP.YC.YR.JBIGS.XLBIGS.BIGS.SMALS.DSS
      CDMMON XXN(8). CLE-ERC.YYY-YN-ITERA.XXXIO(8).XXXIO(8).XXX(8).
CDMMON PSIZ-LP-SARC(513).SARCD(513).LP-M-DE
      COMMON BETAN(513) . BETAM(513) . IJ. LPK. XII(200) . XJJ(200) . XJX
      COMMON XROUND, AZAA, 3233, C2CC
      COMMON AAAA.BBBB.CCCC.AB.BB.CC.T.DB.TSAUS(100).46AUS(100).NGAUS
      COMMON/SPC/ESPACE
       UATU\ILAT\VOPPC
       SZEIE "NEJVAS/ITYS/POMMCS
I XICC IS THE CAVITY END PINT CALCULATED IN SUB. CAVITY.
      CDEL = COSCDELTA)
      SDE_ = SIN(DELTA)
      PAI = 3-141592654
      DJ 1 LOA=1+8
    1 KST(LDA) = YXS(LDA)
      SCGM = SQRT(1.+XST(5))
      CCC1=AL3G(1.+xST(6))/(2.+PAI)
      SSG=SQRT(1.+XST(6))
      J2=035(A_FA1+GAMMA)/035(XST(5)+GAMMA)/ESPACE
      J22=J2**2
      U22I=1./U22
      THO=SSG + CAVLEN/J2+(1.-CAVLEN)
      TAURD=ALDS(TRD)
      Td1=SQRT(1--(1--XST(6)-J221)+CAVLEY)
      TAUW1=ALOG(TW1)
      OWUATERUAT (O.ES.LATU) FI
      IF (UFAJ.E3.1) TAUETAJH1
      NCAV=80
      VCAV1=VCAV+1
      CAVS = (XST(2)-XST(1))/NCAV
      LEAVE THE LAST POINT OF XSI = C SINCE THERE IS A
         SINGULARITY FOR SINGLE SPIRAL VORTEX MODEL.
      DD 2 <_4 = 1.4CAV1
      ACA = AST(1) +CAVS+ (KLM-1)
REAL PART OF DMEGA = BETA+ PAI.
      1= (<_M.E3.1) GD TD 3
1=(KLM.E3.NCAV1) GD TD 10
C----- Cl(xSI) CALCULATION, CALLING OFSIMI.
      I= (IJ.GE.34) GO TO 75
      NOF = 3
      CALL DESIGNANS. NOF. (CA)
      ANS IS A SOLUTION FOR IC1(XCI) . XCI IS IDENTICAL TO XCA.
      IF (IJ.EQ.27) ANSI1(CLM) = ANS
      60 TO 76
   75 ANS = ANSII(KLM)
   75 CONTINUE
C---- IC2(XSI) CALCULATION.
      1=(13.05.34) 30 TO 77
```

```
CALL IC2(SR.SM.XCA.ISIC)
      DALA 28 IS ALIFOR SA IS LOW MAINLY
      I=(IJ_*EQ_*27) SRI2(<_4) = SR
      33 73 78
   77 SR = SRI2(KLM)
   TB CONTINUE
C----IC3 (XSI) CALCULATION-- USE CHEBYSHEV-GAUSS
      SUBSTRATURE FORMULA.
      3PC5 = (XST(1) + XST(2)) * .5
      C4B5 = (xST(2) - xST(1)) + .5
      A31 = (9PC5+1.)/C485
      A32 = (-8°C5+XST(3))/CM85
      EK1 = XCA-XST(2)
      EK2 = (xCA+1+)+(xCA-xST(1))+(xCA-xST(3))
      EK3 = SQRT(EK1/EK2)
      E=38 = C#85+E43
      I= (IJ+6E+34) 60 TO 80
      SI23 = 0.
      YEHOM = 1.NCHBY
      EJ1=(AJ(ISJ4)+A31) *(A32-AJ(ISJ4))
      SEU1 = SGRT(EU1)
      EF3 = (1.-AJ(ISUM))/SEJ1
      EF3A = CM35+AJ(ISUM)+BPC5-KCA
    5 SIC3 = SIC3+(EF3-EF38+SQRT(1.-AJ(ISJM)++2))/EF34
      SIC3 = SIC3*PAI/NCH9f
      SIC3 = SIC3+ALOG((XST(2)-XCA)/(XCA-XST(1)))+EK3
      1 = (IJ_0 E g_0 27) SIC3I3((-4) = SIC3
      GO TO 81
   30 SIC3 = SIC313(KLM)
  31 CONTINUE
     -IC4(XSI)----
      JSE CHEBYSHEV-GAUSS BUADRATURE FORMULA
         IN THE SAME MANNER AS THAT FOR IA IN
         DFSI43.
      IF(IJ.GE.34) GO TO 32
      FPC5 = (XST(3)+XST(2))*+5
      *405 = (XST(3)-XST(2))+.5
      A41 = (FPC5+1.)/FMC5
      442 = (FPC5-XST(1))/F4C5
      SIC4 = 8.
      DO 7 ISUM= 1.NCHBY
      RA = (BETAN2(ISUM)+PAI)+(1.+AJ(ISUM))
      (SFA+(PUZI)UA)+(IPA+(MUZI)UA) = EF
      SR9 = SIRF(RB)
      RC = RA/SRB
      RD = FMC5+AJ(ISJ4)+FPC5-XCA
    7 SIC4 = SIC4+RC/RD
      SICA = SICA+PAI/NCHBY
      I=(IJ.EG.27) SIC414((L4)= SIC4
      30 TO 33
  32 SIC4 = SIC414(<_4)
   33 CONTINUE
      IF (IJ.EQ.27.AND.KL4.E2.2) ERITE(6.55) ANS.SR.SIC3.SIC4.KLM
      IF (IJ.EG.27.AND.KL4.EQ.40) WRITE(6.55) ANS+SR.SIC3.SIC4.KLM
      IF (IJ.E2.27.AN). <L4.E3.80) #RITE(5.55) ANS. SR.SIC3. SIC4. KLM
   55 FORMAT (1)x++---11+12+13+14 OF CAVITY ARE---++4(E14+7+2X)+2X+
     A+<LM=+, 143
  HOCKSI) = 1/E(3 ALREADY CALCULATED.
     UU2 = COS(ALFA1+GAMMA)/COS(XST(5)+GAMMA)/ESPACE
2 - - - - - [ ] - - - - - - - - - - -
```

```
SP1H=(XST(7)+1.)+.5
      3414=(xST(7)-1.)+.5
      A51=(341H-XST(2))/(-G*1H)
      A52=(GM1H-XST(1))/(-GP1H)
      453=(341H-XST(3))/(-321H)
      SIC5=0.
      00 30
               ISJM=1.NCH3Y
          =-(1.+AJ(ISUM)) +(AJ(ISUM)+A51)
      ₹ 4
          =(AJ(ISU4)+A52)+(AJ(ISJM)+A53)
      ₹ 3
      SRAB=SERT(RA/RB)
      RC=-GP1H=AJ(ISUM)+GM1H-XCA
      F5=SR43/RC
   30 SIC5=SIC5+F5
      SIC5=PAI+SIC5/NCHBY
C ----IC6-----
      44F4=(xST(3)-xST(3))+.5
      42F4=(KST(3)+KST(3))+.5
      A61=(HPFH-XST(2))/H4FH
      A52=(42FH+1.)/HMFH
      A63=(HPFH-XST(1))/H4FH
      SIC6=0.
      20 40
             ISUM=1.NCH9Y
      TA = (1.-AJ(ISUM)) + (AJ(ISUM) + A51)
          =(AJ(ISJ4)+A52)+(AJ(ISJ4)+A63)
      ₹3
      SRAB=SQRT(RA/RB)
      ACXHFF9F+(MUZI)UA+FFH-XCA
      F6=SRAB/RC
  +0 SIC6=SIC6+F6
      SICS=PAI+SICS/NCHBY
      30 = (-ANS/PAI-SR+(3001-AL03(UU2)/PAI)+SIC3
     1-SIC4/PAI)/EKS
      GC=GC+TAUd+(-SIC5+SIC6)/PAI/EK3
      30 TO 25
    3 GC = BETAB+PAI
  33 TO 25
10 30=8ETAC+PAI
C BETAR AND BETACK BODY ANGLES AT B AND C) MUST BE SPEICIEED IN COMMON.
  25 CONTINUE
      xxs = xca+cdel
      YYT = XCA-XST(4)+SDEL
      YY12 = YYT++2
      XXU = XST(4)+CDEL
      X4J2 = XXJ**2
      XYB = YYT2+XXJ2
      DADE = DGAP+XXS/(XY3+PAI)
      cgc = cos(gc)
      SSC = SIN(SC)
      CFC = DWDX/SCGM
      CKEX(KLM) = CGC+CFC
      SKEY (KLM) = SGC+CFC
    2 CONTINUE
      C4VXX(1)=3.
      CAVYY(1)=0.
      JO 15 ICAV=3+NCAV1+2
      CAYXX(ICAY) = CAYXX(ICAY-2)+CAYS+(C(EX(ICAY-2)+4.*
     1CKEX(ICAV-1)+CKEX(ICAV))/3.
   15 CAVYY(ICAV) = CAVYY(ICAV-2)
     1*CAVS*(SKEY(ICAV-2)+4.*SKEY(ICAV-1)+SKEY(ICAV))/3.
      IF(IJ.E3.27) 30 TO 100
      GO TO 181
```

* *

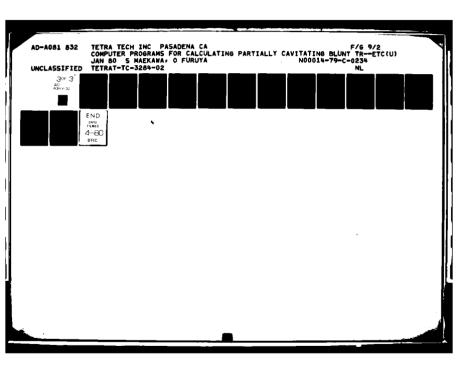
```
SUBROUTINE RMINT (SR.SM. 412)
   DIMENSION (ST(8)
   COMMON YCCC+SBETA2
   CJ440N XIT4(200) +XIT4(200) +ANS32S(230) +SARC2(200)
   COMMON CAVX(100).CAVY(100).BETAB.BETAC.XCCC.NCAV.LPMM.NS2
   COMMON AU(100), ISHARP, NCHBY, BBTAN(130), BBTAN2(100), BETAN2(100)
   COMMON FLAPAN, DELTA, DGAP, ALFAI, SAMMA
   POPMES
                 SBETA, XX4. ICPI. SARCO3(513)
   COMMON IDJL, XA, XB, XC, TANG, EP, YC, YR, JBIGS, KLBIBS, BIGS, SMALS, DSS
                       CLE.ERC.YYY.XM.ITERA.SXSIO(8).SXSIOO(8).YXS(8)
   COMMON XSN(B)+
   COMMON PSIZ, LP, SARC(513), SARCO(513), LPM, DE
   COMMON BETAN(513)+BETAM(513)+IJ+LPK+XII(200)+XJJ(200)+X3X
   COMMON XROUND+AZAA,3233,C2CC
   CDMMON AAAA,BBBB,CCCC,AB,BB,CB,DB,TGAUS(100),4GAUS(100),NGAUS
   COMMON/SPC/ESPACE
   PAI = 3.141592654
   IF (ICPI.EQ.0) GO TO 10
   JJ 12 I5 = 1.8
12 XST(IE) = XSN(IS)
   30 TO 11
10 00 1 IS = 1.8
 1 \times ST(1S) = Y \times S(1S)
11 CONTINUE
   XX1 = XST(4)+SIN(DELTA)
   XY1 = XST(4) +COS(DE_TA)
   YY12 = YY1**2
   35 = (xST(2) - xST(1)) * .5
   305 = (xST(1)+xST(2))+.5
   A31 = (8C5+1.)/C85
   432 = (-805+XST(3))/085
   8415 = (xST(1)-1.)*.5
   3°15 = (XST(1)+1.)+.5
   A11 = (9415-XST(2))/3^215
   412 = (9M15 - XST(3))/3^215
   = 2C5 = (XST(3)+XST(2)) + .5
   FMC5 = (XST(3)-XST(2))+.5
   3-14=(XST(7)+1.)+.5
   341H=(XST(7)-1.)+.5
   H4FH=(XST(8)-XST(3))+.5
   HPFH=(XST(3)+XST(3))**5
   A51=(341H-XST(2))/(-371H)
   A52=(341H-X5T(1))/(-321H)
   A53=(341H-XST(3))/(-971H)
   A51=(HPFH-XST(2))/H4=H
   A52=(HPFH+1.)/HMFH
   A63=(42FH-XST(1))/H4F4
   A41 = (FPC5+1+)/F4C5
   442 = (FPC5-XST(1))/F4C5
   IF (MIA.EA.6) 30 TO 6
   IF (MIQ.E2.5) GO TO 5
   I=(413.EQ.4) 60 T3 4
   IF (MIQ.EQ.3) GO TO 3
   I# (MIG.EG.2) GO TO 2
   AUTION ARE ALREADY CALCULATED IN SUBROUTINE
        TFINTLT AND STORED IN COMMON AREA.
   53=0.
   S4=0.
   YBHOM = 1 - NCHBY
   GX1 = 1.-AJ(ISU4)
   3Y1 = (AJ(ISUM)+A31)+(A32+AJ(ISJM))
```

```
SSY1 = SQRT(GY1)
    FF3 = GX1/SGY1
   FK1 = CB5+AJ(ISJM)+3C5
   FX2 = FX1-XX1
    FX22=FX2**2
   FX3 = FX22+YY12
   ==31 = FX2/FX3
   FF32 = YY1/FX3
    SR = SR + FF3 + FF31
20 S4 = S4+F=3+FF32
    SR = SR + PAI / NCHBY
    SM = SM + PAI/NCHBY
 0001 OT CE
SUNTINCE &
   52=0.
   S4=0.
   33 50
              YEHON . I = PLZI
   5x1 =-(1.+AJ(ISUM))*(AJ(ISJM)+A51)
5x2 =(AJ(ISJM)+A52)*(AJ(ISJM)+A53)
   ==3=SQRT(GX1/GX2)
   XSP=-SP1H+4J(ISUM)+3M1H
   X2K1=K52-KK1
   XPX12=XPX1++2
   3372=XPX12+YY12
   FF31=XPX1/80T2
   ## 32=YY1/30T2
   SR=SR+==3+==31
50 S4=SM+=F3+==32
   SK=SK+PAI/WCHBY
   SM=SM+PAI/NCHBY
   50 TO 1000
 6 CONTINUE
   53=0.
   S4=0 .
   JJ 70
              ISJM=1.NCH3Y
   3x1 =(1.-4J(ISJM))+(4J(ISJ4)+461)

Gx2 =(4J(ISUM)+462)+(4J(ISJM)+463)
   ==3=S2RT($X1/$X2)
   HICH+(PUZI)LA+HIPFEZX
   xºx1=xSP-xx1
   X3X12=X3X1++2
   30T2=XPX12+YY12
   F=31=x2x1/30T2
   FF32=YY1/B0T2
SR=SR+FF3+FF31
70 54=54+==3+==32
   SR=SR+PAI/VCHBY
   SH=SH+PAI/VCHBY
   30 TO 1000
2 CONTINUE
   IF (ISHARP-EQ-1) GO TO 100

ISHARP = 1 MEANS THAT THE FOIL HAS ROUNDED _-E-
SO THAT THE SIMPSON'S RULE IS USED+
ISHARP = 0 MEANS THAT THE FOIL HAS SHARP L-E-
   SO THAT CHEBYSHEY GAUSS FORAULA CAN BE USED AS BELOW.
   SR = 0
   S4 = 0
   00 30 ISUM = 1.NCHBY
   STIL = AJ(ISUM)+A11
   ST12 = AJ(ISU4)+A12
```

```
FK1 = BBTANCISUM)+S2RT(ST11/ST12)
     1N1 = 3P15+AU(ISU4)+3415-KK1
     UN12 = UN1**2
     JV13 = UN12+YY12
     FK11 = UN1/UN13
FK12 = YY1/UN13
     SR = SR+FK1+FK11
  30 SM = SM+FK1+FK12
     SR = SR*PAI/NCHBY
     SM = SM+PAI/NCHBY
     33 TO 1000
130 CONTINUE
THIS IS THE CASE THAT THE FOIL HAS ROUNDED LOES
     10F = 1
     XCA = 0.
     CALL DESIGNOR+NOF+KCA)
 KCA IS DUMMY----ONLY USED FOR F(5) IN DXFNEW.
     VDF=2
     CALL OFSIMI(SM.WOF.XCA)
30 TO 1000
   3 CONTINUE
     USE CHEEYSHEV+GAUSS FORMULA SINCE BETA
     .HTCCP2 ZI VCIE35 ZIHT VI
     BBTAN2 (ISUM) ARE ALREADY CALCULATED AT TRINTLT.
     S4 = 0.
     33 50 ISUM = 1.NCHBY
     ?SL = (957472(ISJ4)+241) *(1.+4J(ISJ4))
     PSM = (AU(ISUM)+A41)+(AU(ISUM)+A42)
     Sarsm = Sart(PSM)
     FF4 = PSL/SQPSM
     PSV = F4C5+4J(ISJ4)+FPC5-XX1
     PSN2 = PSN++2
     FF41 = PSN/(PSN2+YY12)
     FF42 = YY1/(PSN2+YY12)
SR = SR+FF4+FF41
     54 = 54+ FF4 + FF42
  50 CONTINUE
     SR = SR*PAI/NOHBY
     SH = SM*PAI/NCHBY
     30 TC 1000
   SUVITIVES #
     XCA IS DUMMY. ONLY JSED FOR ICE IN F(5)
     XCA = 0.
     ISIC = G
     SUBTOUTINE ICE IS ALSO USED IN F(5).
CALL ICE(ST.+PR.+PR.+PE)
1000 RETURN
     END
```



```
COMMON/FREECAV/XFREEC YFREEC
               UB Co UBO o UB Bous A COCCO CO UBB BB o CAAAA o COCCO CB B S E O CASA N S E O C NO PPCO
              COMMON YCCC+ SBETA2
              COMMON XITH(200)+XITN(200)+ANSG2S(230)+SARC2(200)
               COMMON CAVX (100) + CAVY (100) + 3 ETAB + 3 ETAC + XCCC + NCAV + LPMM + NS2
               COMMON AJ(100)+ISHAR>+WCHBY+BBTAW(100)+BBTAW2(100)+BETAW2(100)
               COMMON FLAPANODELTA-JGAP-ALFA1-SAMMA
                                              SBETA . XXM . ICPI . SARCOD(313)
               COMMON
              COUNTRY SOIE . SEIELX . SOIE LAST SOIE . SOI
                                                            CLE.ERC.YYY.XM.ITERA.SXSIO(8).SXSIOO(8).YXS(8)
               COMMON XSN(B).
              COMMON PSIZ-LP+SARC(513)+SARCO(513)+LPM+DE
               COMMON BETAN (513) + BETAM (513) + IJ + LPK + XII (200) + XJJ (200) + XOX
               COSO+6656+AASA+GRICAX FORMICA
               CD440V AAAA, 6383, CCC2, A8, 38, C3, 28, T3AJS(100), 4GAJS(100), VGAUS
               COMMON/SPC/ESPACE
              PAI =3-141592653
              X2=X++2
              x3=x++3
              XS=SQRT(X)
               XH=X+XS
              XFREE2=XFREEC++2
              XFREE3=XFREEC++3
               XFREES=SORT(XFREEC)
               XFREEH=XFREEC+XFREES
               X22=-2++2
              x23= -2 + + 3
              X2S=SaRT(.2)
               X2H= -2 + X2S
               X82=+8**2
              X83=+8++3
              X8S=SQRT(.8)
               X8H=X8S+.3
O WE MUST CHECK TO SEE IF WE ARE SOINS TO CALCUATE THE TOP PART OF THE BOTTOM PART. IF TOP WE TRANSFER TO 2ND HALF OF ROUTINE.
C ISIL2 = 3 IS USED FOR CALCULATIONS OF UPPER FOIL PROFILE
               IF(IS1I2-EQ-1) 30 TO 30
              L= (IS1I2.E2.3) 63 f3 30
              IF (X.LE..2) SO TO 15
LF (X.LE..3) SO TO 20
               LF (X.GT..8) $0 TO 25
       15 Y=A2AA+X+B29B+X2+C2CC+X3
               YJX=A2AA+3298+2.+X+C2CC+3.+X2
               CXCY)MATA=ATEE
               GO TO 60
       20 Y=AAAA*(4./3.*X+8./3.*XH-4.*X2)+8883*X+CCCC*XS
              YOX=AAAA+(4./3.+8./3.*1.5*XS-8.*X)+3888+.5*CCCC/XS
               (XGY)VATA=ATIE
               30 TO 60
       25 Y=A3+33+X+C8+X2+08+X5
              Y3x=83+2.+35+x+3.+03+x2
               BETA=ATAN(YOX)
               63 TO 68
CITHIS AND HALF OF THE ROUTINE IS FOR CALCULATING THE UPPER HALF
```

SUBROUTINE SHAPE(X.f. BETA. IS112)

```
30 I= (IS112.EQ.3) GO TO 70
    IF (XFREED-LE--2) 33 TO 35 IF (XFREED-LE--8) GD TO 50 IF (XFREED-GT--8) GD TO 55
 70 CONTINUE
    L= (x.LE..2) GO TO 35
    IF (X-LE--9) 60 TO 50
IF (X-6T--8) 60 TO 55
 35 IF (IS112.E2.3) GO TO BO
    R1=YFREEC-A2AAU+XFREED-B2BBJ+XFREE2-C2CCU+XFREE3
    30 TO 81
 30 31=0.
 31 CONFINJE
    I= (x.GT..2) GO TO 48
    Y=A2A4U+X+32B3U+X2+32C3U+X3+R1
    Y0x=A2AAU+2.+928BU+x+3.+C2CCU+X2
    IAC-CXCY)MATA=ATEE
    33 TO 50
 10 Y2=4244U=.2+92B3U=X22+C2CCU=X23+R1
    72=12-AAAAJ+(4./3.*.2+8./3.*x2H-4.*(22)-8383U*.2-CCCCU+x2S
    IF (IS112.EQ.3) R2=0.
I=(x.3T..3) G3 T0 45
    Y=AAAU+(4./3.+X+8./3.+XH-4.+X2)+3839U+X+CCCCU+XS+R2
    2x\U3C3C+2.+UE8EE+(x+.8-2x+2.1+.5\.8+.5\.4)+UAAAACY
    IAG-(XCY)ATA=ATIE
    33 TO 66
 15 Y3=A8J+38J+.8+C8U+X32+D8U+K33+R2
    R3=Y3-A8U-B8U+.8-C8J+X82-D8J+X83
    IF (IS112.E2.3) R3=).
 46 Y=A8U+88U+X+C8U+X2+D3U+X3+R3
    YJX=89J+2++C8J+X+3++3BJ+X2
    IAG-(XOY)VATA= ATEE
30 TO 60
30 IF (IS112.E2.3) 60 TO 90
    R2=YFREEC-AAAAU+(4./3.+XFREEC+8./3.+XFREEH+4.+XFREES)-BBBBU+XFREEC
   1 -CCCCJ+xFREES
    GO TO 91
30 R2=0.
 31 CONTINUE
    I= (x.GT..3) SO TO 35
    Y=AAAAJ+(4./3.+x+8./3.+xH-4.+x2)+3339U+x+CCCCJ+xS+R2
    YOX=AAAAU+(4./3.+8./3.+1.5+XS-5.+X)+9888U+.5+CCCCU/XS
    BETA=ATAN(YOX)-PAI
GO TO 60
55 IF (IS112-E2-3) GO FO 100
    RS=YFREEC-ABJ-BBJ+XFREEC-CBJ+XFREE2-DBJ+XFREE3
    33 TO 101
130 33=0.
101 CONTINUE
    33 TO 46
SO RETURN
    EAD
```

```
SUBROUTINE XCYC(XCB+YCB+CX+CY)
  COMMON/UPPER/ARAU+3238U+CCCCJ+AAAAJ+BBBU+CCCCJ+ABJ+38U+CBU+DBU
  X4=CX
  XK2=XK++2
  K42=X4++3
  XKS=SQRT(XK)
  X<H=X<+XKS
  IP=0
  IF (CX-LE--2) 60 TO 3
 IF (CX.LE..3) 63 TO 8
IF (CX.GT..8) 60 TO 5
3 F1=A2AAU+K<+8288U+X<2+C2CCJ+X<3
 F2=A2AAU+2.+B2BBU+XK+3.+C2CCU+XK2
  F3=XK-CX
  FXK=F1+(F3/F2-CY)
 01=F2
  32=(31+F3+(2.+B233U+5.+C2CCJ+XK))/D1++2
  JFXK=31+02
  21V=FXK/D=XK
  XK=XK-OIA
  IP=IP+1
  Z=A3S(DIV/X()
  I=((Z.LE..000001).02.(IP.E2.20)) 30 TO 6
 33 13 3
4 F1=AAAAU+(4./3.+XK+3./3.+XKH-4.+XK2)+BBBBU+XK+CCCCU+XKS
 =2=AAAAU+(4./3.+8./3.+1.5+X<S-8.+XK)+888BU+CCCCJ+.5/XKS
  F3=XK-CX
  FX<=F1+(F3/F2-CY)
 31=#2
 D2=(D1-F3+(AAAAJ+(8./3.+1.5+.5/XKS-3.)+CCCCJ+.5+.5/XKH))/D1++2
  3-X<=01+05
 JIV=FXK/DFXK
 1>=1P+1
  Z=ABS(DIV/XK)
 I=((Z.LE..000001).0R.(IP.EQ.20)) 33 TO 6
 30 TO +
5 F1=A8J+B8J+XK+C8U+X<2+D8U+X<3
 =2=38J+2.+CBU+XK+3.+33J+XK2
 F3=XK-CX
 FXK=F1+(F3/F2-CY)
 01=F2
 D2=(D1-F3+(2.+CSU+6.+DSU+x<))/D1++2
  3=X<=31+02
 DIV=FXK/DFXK
 VIG-XX=DIV
  IP=IP+1
  Z=ABS(DIV/X()
  IF((Z.LE..000001).37.(IP.E3.20)) 33 TO 6
 33 TO 5
6 KCBEX4
 IF (CX.LE..2) YCB=A2AAU+XK+323BU+XK2+C2CCU+XK3
 IF(CX-LE--B) YCB=AA4AJ+(4-/3-+K+8-/3-+XKH-4-+X(2)+998BU+XK
 X +CCCCU+XKS
 1 (Cx.GT..8) YCB=A3J+38U+X4+C8J+X42+D8U+X43
  RETURN
 END
```

```
SJBROUTINE ARCS2(S2,4C.YC)
COMMON/FOILENO/XXDD.YYDD
COMMON/FOILENO/XXDD.YYDD
COMMON/FOILENO/XXDD.YYDD
COMMON/FOILENO/XXDD.YZDBJ,C2CCJ.AAAAJ,BBBBU,CCCCJ,ABU,BBJ,C8U,DBU
XXDD IS THE ENDPOINT OF THE UPPER FOIL OFFSET
CXDC=XXDD
XHIGH=0.
XLOd=0.
XLOd=0.
XLOd=0.
XLOCT=(CKDD-XC)/50.
I= (XINCRT.LE.0.) XIVCRT=-XINCRT
IS112=1
82=0.
DD 24 IINC=1.50
XLOM=XHIGH
XHISH=XLOd+XIVCRT
CALL ARCLEV(S,XLOd+XHIGH+IS112)
24 S2=S2+S
RETJRN
END
```

SUBROUTINE ARCLEN(XSS+XL+XH+IS112) COMMON YCCC.SBETA2 COMMON XITM(200)+XITM(200)+ANSG2S(200)+SARC2(200) COMMON CAVECIOD) CAVECIOD) DETABLETAC DETABLET AC DECENCAV DEPAMONS CODISEATACO (BELISEATABLE COLISEATABLE TARRAMAN COLISEATA (BELISEATABLE) COMMED AMPACALALACA LA CALLACA LA CAL COMMON SBETA + KK4-1CPI+SARCOD(513)

COMMON IDUL+XA+XB+XC+TANG+EP+YC+YR+JBIGS+XLBIGS+BIGS+SMALS+DSS

COMMON XSV(8)+ CLE+ERS+YY+KM+ITERA+SXSIO(8)+SXSIO(8)+YXS(8) COMMON PSIZ-LP-SARC(513)-SARCD(513)-LPM-DE COMMON BETAN (513) + BETAN (513) + IJ+ LPK+ XII (200) + XJJ (200) + XDX COSO+BESE+AASA+CVCRX VOPPCO COMMON AAAA, 8888, CCCC, A8, 86, C8, 38, T3AUS(100), 4GAUS(100), NGAUS DIMENSION T(180) + 4(138) + F(138) N=NG AUS 33 5 J=1.V (L) 2UA ET= (L) T 5 d(J)=dSAUS(J) 1 334=0. DD 2 J=1+4 CALL FC2(T(J)+F(J)+KL+XH+IS1I2) 2 SUM=SU4+W(J)+F(J) PL2=22x RETURY CVD

.

```
SUBROUTINE FC2(T+F+K-+XH+IS1I2)
  COMMON/UPPER/AZAAU+3288U+C2CCU+AAAAJ+888BU+CCCCU+A8U+88U+C8U+D8U
  COMMON YCCC+SBETA2
COMMON XITH(200)+XITY(200)+ANSG2S(200)+SARC2(200)
  COMMON CAVX(100) +CAVY(100) + BETAB+BETAC+XCCC+NCAV+LPMM+NS2
  COMMON AJ(100) . ISHAR > . NCHBY . BETANCIJO ) . BBTAN2(100) . BETAN2(100)
  COMMON FLAPAN.DELTA.DGAP.ALFA1.GAMMA
                SBETA+XX4+ICPI+SARCD3(513)
  VOPPES
  COMMON IDUL, XA. XB. XC. TANG. EP. YC. YR. JBIGS. XLBIGS. BIGS. SMALS. DSS
  COMMON XSN(8).
                     CLE+ERC+YYY+XM+ITERA+SXSIO(8)+SXSIOO(8)+YXS(8)
  COMMON PSIZ.LP.SARC(513).SARCO(513).LPM.DE
  COMMON BETAN (513) + BETAM (513) + IJ+LPK+ XII(200) + XJJ(200) + XOX
  CCSC+8656.AASA+GVLCSX VOPMCC
  COMMON AAAA-BBBB+CCCC+A8+B8+C8+D8+T3AUS(1G0)+#GAUS(1G0)+NGAUS
  LICONF=1
  XP=(XH-XL)+T+.5+(XH+XL)+.5
  SXP=S2RT(XP)
  XP2=XP++2
  IF(XP+3E++3) GO TO 1
  # CT CE (L.E3.7VC3II.GNA.S..3. TO 4
  IF(XP.LE..2) GO TO 3
  P1=(4./3.+4.+5x2-4.*x2)+A4A4
  P2=8888
  P3=.5.CCCC/SXP
  I= (IS112.EQ.1) P1=(4./3.+4.+SXP-4.+XP)+AAAAU
  I* (IS112-24-1) P2=3338U
  If (IS112.E2.1) P3=.5.0000U/SKP
  50 TO 2
3 P1=--5+SQRT(2.+XRJUND)/SXP+4244
  P2=8298+SXP+1.5
  P3=2.+C2CC+XP
  I= (ISII2-EQ-1) P1=--5+SQRT(2--KROJVD)/SXP+A2AAJ
  I= (IS1I2.E4.1) P2=3238U+SXP+1.5
  If (IS112.E3.1) P3=2.+C2CCJ+KP
  30 TO 2
4 CONTINUE
  P1=A2AA
  P2=2.+3293+XP
  P3=3 + * C2CC * XP2
  IF (IS112-EQ-1) P1=A2AAU
  I (IS112.22.1) 22=2.+3233J+x2
  IF (IS112.EQ.1) P3=3.+C2CCU+xP2
  30 TO 2
1 P1=88
  P2=2.+C8+xP
  P3=5.+D9+X22
  IF (IS112.EQ.1) P1=33U
  IF (IS1I2-E2-1) >2=2-+C8J+x>
  IF (IS112.E4.1) P3=3.+D8U+xP2
2 P4=P1+P2+3
  2422P4++2
  P5=1.+P42
  5°5=52RT(°5)
  F=(XH-XL)+SP5+.5
  RETURN
  END
```

**

```
SUBROUTINE BBBETA(XX.RBETA.IS112)
C THIS SIVES BETACK(XSI)).
                             COMMON YCCC+SBETA2
                             COMMON XIT4(200) . XIT4(200) . ANSG2S(200) . SARC2(200)
                             COMMON CAVX(100),CAVY(100),BETAB,BETAC,XCCC,NCA/,LPMM,NS2
                             CODISMATA COLLISMATER (COLLISMATER CARTON CARTON COLLISMATER COLLI
                             VOPPCD
                                                                                           SBETA+XX4+ICPI+SARCO3(313)
                             COUPLIANCE SEE STANKES SEE OF A PARTIE AND A STANKES AND A
                             COMMON XSV(B).
                                                                                                                        CLE.ERC. TYY. (M. ITERA. SXSIO(B). SXSIO(B). YXS(B)
                             COMMON PSIZ.LP.SARC(513).SARCO(513).LPM.DE
                             234404 BETAY (513) + BETAY (513) + IJ+ L2K+ XII (200) + XJJ (200) + XXX
                             COMMON XROUND.AZAA.3238.C2CC
                             COMMON AAAA, BBBB,CCCC.AB,BB,CB,DB,TJAUS(100),JGAUS(100),NGAUS
                             ER1=5.E-3
                             €₹2=5•€-3
                             I=(IS112.52.1) 30 TO 20
: IS112=0 FOR S1.
: 1 FOR S2.
                             LPMAA=LPM-1
                             SMALS=SARC(LP)
                             IFELP-EQ-LPM) GO TO 13
                             DSS=SARC(_P)-SARC(LP+1)
                             X_24=XX
                             60 TO 21
              20 SHALS=SARC2(LP)
                             IF(LP-EQ-1)30 TO 110
                             X_PA=XX
                             JSS=SARC2(LP)-SARC2(LP-1)
               21 CONTINUE
                             KIASK_PA
                   4 X18=X1A+.001
                             CALL FARC(FAR+XLPA+X13+IS1I2)
                             IF(FAR-LT-0+) GO TO 3
                            X1A=X13
                             30 TO 4
                  3 CALL MOSEC(XIA+X18+ER1+ER2+XX+JII+X_PA+IS1I2)
30 TO 11
              10 xx=6.
                           50 TO 11
          110 XX=XCCC
              11 CAL_ SHAPE(XX+Y+RBEF4+IS112)
                             RETURN
                            END
```

**

```
SJBROUTINE MOSEC(A+3+ER1+ER2+X+J+XLPA+IS112)
    J= 0
    X1=4
    X2=3
 4 3=3+1
    IF (J.3E.800) 60 TO 9
    CALL FARCIPFX1.xLPA.X1.IS112)
   CALL FARC(PFX10xLPA0xX1015112)
X3=XX0(X2-X1)0PFX1/(PFX1-PFX2)
CALL FARC(PFX30xLPA0x30IS112)
LF(PFX3)1020
 1 x2=x3
    X1=X1
    IF (A-3)10,10,11
10 Y=X3-ER1
    I=(Y-LE-0-) Y=0-
    30 TO 12
11 Y=X3+ER1
12 CALL FARC(PFY, XLPA +Y + IS112)
    IF(PFY) 5.2.2
 3 x1=x3
   X2=X2
IF(A-3) 20,20,21
20 Z=X3+ER1
    33 L2 55
21 Z=X3-ER1
22 CALL FARC(PFZ, XLPA, Z, IS112)
1F(PFZ) 2, 2, 5
 5 30 TO 4
2 PP= ABS(PF(3)
    IF (PP-ER2) 6.6.4
 5 X=X3
 GO TO 7
9 HRITE(6+9) J
9 FORMAT(1X+2HJ=+13)
   STOP
 7 RETURN
   END
```

```
FUNCTION AITKEN(XX,YY,X,N)
DIMENSION XX(1),YY(1),ZZ(21)
IF (N)1.1.2

1 AITKEMETY(1)
RETURN
2 IF (N.GT.20) N=28
M=N+1
DO 3 K=1.M
3 ZZ(K)=YY(C)
JO 4 I=1.M
DO 4 J=1.M
4 ZZ(J+1)=ZZ(I)+(X-XX(I))+(ZZ(J+1)-ZZ(I))/(XX(J+1)-XX(I))
AITKEMEZZ(N+1)
RETURN
END
```

```
SUBROUTINE DETERM (A.N.D)
  DETERM REVISED 02-28-73
      REAL M
      DIMENSION A(50,50), SAVEA(50,50)
      IF (4 .E3. 1)GD TO 45
      := 1.
      VN = V

00 9 J = 1.NV

00 9 I = 1.NN
      SAVEA(I,J) = A(I,J)
      K = 1
      30 TO 13
12 < = < + 1
13 I = < + 1
       = <
      SO TO 17
      I = I + 1
     IF (ABS(SAVEA(I+K)) +GT+ ABS(SAVEA(L+K))) _ = I
IF (I +NE+ NN)33 TO 15
IF (L +E2+ K)GO TO 23
      J = K
      ROW INTERCHANGE
      30 TO 23
J = J + 1
 22
      SAVE(J = SAVEA(K+J)
      SAVEA(K.J) = SAVEA(L.J)
SAVEA(L.J) = SAVEKJ
      IF (J .NE. NN)50 TO 22
28 I = K + 1
    30 TO 31
I = I + 1
30
      BUNITICS
31
                                                                                        02-20-73
      IF (SAVEA((+() .E2. 0.) 30 TO 48
      M = SAVEA(I+K) / SAVEA(K+K)
      SAVEA(I,K) = 0.
      J = K + 1
      30 TJ 36
 35 J = J + 1
    SAVEACI, J) = SAVEA(I, J) - 4 + SAVEA(K, J)
      IF (J .NE. NY)30 TO 35
IF (I .NE. NN)GO TO 30
      IF (< .NI. (NN-1))30 TO 12
      0 = 1.
      DO 43 I = 1.444
      J = I
      ) = ) * SAVEA(I+J)
      IF (ABS()) -_T. 1.2-36) GO TO 48
      CONTINUE
43
      9 = 9 + 0
      RETURN
      3 = 4(1,1)
      RETURN
      J = 0.
JRITE (6.51)
43
   FORMAT(//5x+terror MESSAGE FROM DETERM+1/
1 5x+tmatrix is singular+ determinant set = 0+1 //>
      RETURN
      END
```

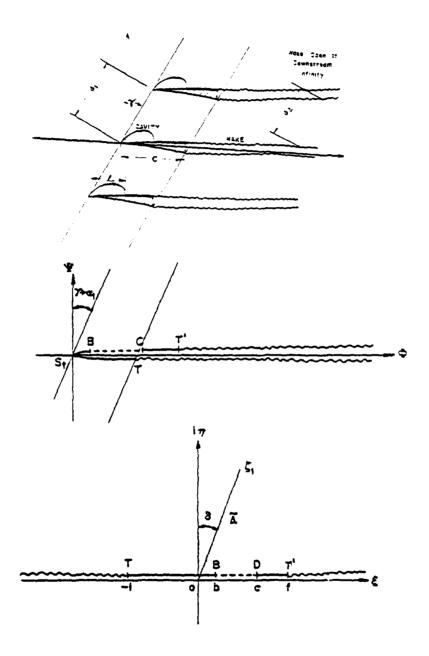


Figure 1 Open Wake Model for PCASE and PCASLE

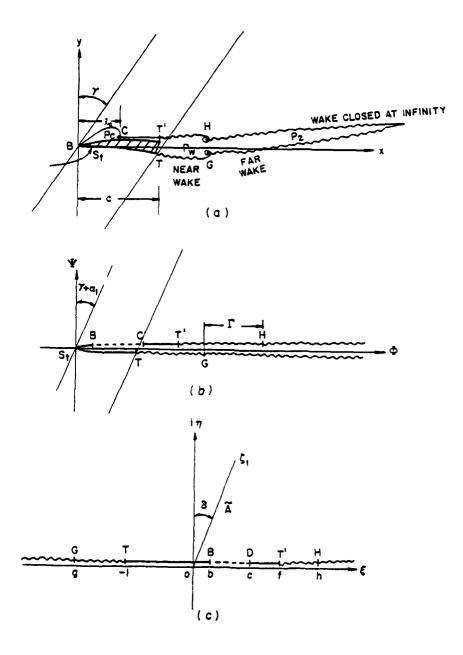


Figure 2 Double Wake Model for PCASLDW

8.0 REFERENCES

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